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Utility Monopoly in Idaho

Because the Idaho Supreme Court has upheld the action of the state commission in refusing to authorize competition against established plants, regulation is under attack in Idaho. Those who are condemning the position of the commission profess to believe that competition will assure development of resources while regulated monopoly will not. They overlook the very important fact that under the prevailing doctrines both consumers and resources require regulation. The state limits the rate of return and establishes the charges for service, and in consideration of these advantages protects utilities from destructive competition. As part of the agreement the utility is, of course, to furnish good service. Competition in public utility service in a single community results eventually in consolidation of the competing plants and hence monopoly. Therefore the commissions have held almost uniformly that it is better public policy to recognize monopoly of this kind in the beginning and protect it during good service than to permit two plants where one would do. The cost of two is greater than the cost of one and in the end, after a union of competing utilities, the public is asked to pay a return on the value of both. To construct new facilities by the side of existing and adequate facilities is not only a waste of private capital, but is an exhibition of public foolishness wherever permitted. Idaho may want to develop its resources, but development at the expense of existing reasonable investment is a sign to the newcomers that their investment may also be jeopardized when another competitor appears.

Politics in Commissions

Do good service and reasonable rates relieve a public utility from serious attack by the community? Is it only when they drop below these fair standards that trouble falls? The perfection of the policy of private ownership with public regulation would assure the acceptance of these standards by consumers. If commissions have a lofty conception of their office they can do much to bring these conditions into existence. Even commissioners who think that no lofty conception of duty moves them can justify these conditions on the plain, wholesome ground of a square deal. The reason why good service and reasonable rates do not carry immunity from attack lies a little below the surface in human nature. The hope that men find in politics has something to do with the answer. One of the easiest roads to public office has always been the one which runs over a public service corporation. There was a very general feeling that the commissions would take the companies out of politics. In the case of many companies this conclusion was correct. The companies did go out of politics. But in some of the states when the companies went out of politics the commissions went in. A growth of this tendency in commission will result in a still worse state of affairs. Both the companies and the commissions ought to be out of politics and stay out. When commissions play politics they level themselves to the plane of politicians. When the politician secures a place on a commission and tries to serve a political party instead of the public as a whole he introduces a weakness which is dangerous to the entire system of regulation. Assuming that they render good service at reasonable rates the companies have the serious task of letting the public know the facts frankly and directly. It is a pity to maintain a property, service and rates that are worthy of public confidence and fail to let the public know it. The public is a safer friend than the professional politician whether or not he is on a commission.

The Senate and Trust Legislation

There has been a good deal of comment on the slim attendance of senators in the Senate chamber during the consideration of trust legislation. The absent senators have not made public explanations of their reasons, but some have gone on vacations and others have simply stayed away. If the measures are to be passed a majority of the Senate will have to take the responsibility for action. The minority will escape the responsibility for action but it will not escape the responsibility for its failure to protest if it is to be found later that the new laws harm business. While the President is the force that is pushing the bills toward enactment he is, after all, merely the head of the executive department of the government. He may ask, he may urge, he may threaten, but the responsibility for the laws as they appear on the statute books will rest partly on Congress. The majority may feel so secure in its strength and ultimate success that it can afford to let matters take any course they will until the day of final votes. The minority may feel impotent in its inability to change the set policy of the controlling party and conclude that any effort is a waste of time. But neither the majority nor the minority can fail to realize that the pending legislation is of grave concern to business. It is proposed to change the rules of business, to introduce a paternalism over trade and industry of greater influence than any other similar legislation

ever enacted in this country. If this legislation shall prove to be harmful to business no one who has the history of the nation in mind will fail to predict an overwhelming rebuke at the polls. Such a rebuke would apply alike, in the end, to the executive and the legislative branches of government. The thing that is really desirable is that the laws shall help business. The House of Representatives lost its opportunity to give careful consideration to the bills by putting them through when the administration or party whip snapped. The conscientious senators will receive the praise of business men for such work as may be done to render the bills really workable instead of impertinent obstacles to straightforward business.

Construction Under Difficulties in Mexico

As showing both the splendid activity in the development of the resources of Mexico and the disastrous effect of conditions there upon industrial enterprises the article by Mr. A. C. Hobble in this issue is much to the point. The hydraulic resources of our neighbor republic are great, and power is sadly needed in the mines for in many districts fuel is almost unattainable even at a very large price. The chances of successful hydroelectric development have been so admirable as to attract capital from this country and from abroad, and under reasonably peaceful conditions industrial development ought to go on with astonishing rapidity. The particular plant which Mr. Hobble describes is that of the Mexico Northern Power Company, a project of exceptional hydraulic interest. High head and adequate storage were to be obtained together by erecting a dam nearly 250 ft. across a canyon with an auxiliary dam 110 ft. high across an adjoining valley. When the great dam is completed the water will be backed up for some 30 miles, giving a storage lake with a capacity of a hundred billion cubic feet, which is enough to compensate admirably for the somewhat variable natural flow of the stream. The power house, which is being built as part of the dam in the bed of the river, is laid out for six 10,000-hp units for feeding energy to a 110,000-volt three-phase aluminum-cable line transmitting 50 miles into the mining district.

A specially striking feature of the undertaking was a 2000-kw steam-turbine plant used for crushers, concrete mixers, hoists and a large variety of other purposes connected with the construction of the two enormous dams. Started three years ago work has been blocked and interrupted repeatedly by the successive revolutions which have overwhelmed industrial Mexico, making it almost impossible to transport supplies or to obtain necessary materials. Toward the end of last year, after a sharp fight had occurred actually in the construction camp, it was necessary to suspend operations and give up the work until political conditions became more stable. Mr. Hobble himself, who fully describes the work up to the time it was necessary to take leave, had to travel 300 miles overland with a party of compatriots to reach the hospitable Texan border. It is earnestly to be hoped that with the efforts now being made at rehabilitating the Mexican government and establishing order once more, it will be possible soon to reopen all the interrupted lines of communications and to draw to conclusion a task so important for the mining interests upon which Mexican prosperity largely depends.

A New Type of Search-Lantern

In the current issue there is described a new type of search-lamp of German invention which is being experimented with by the United States Navy and seems to possess some very interesting and valuable properties. The search-lamp has thus far shown a gradual evolution in size and efficiency unmarked by any very striking innovations since the introduction of the electric arc for this purpose. With the introduction of the arc a source of high intensity became available and search-lantern mirrors were gradually improved until they have now reached a high degree of efficiency. The limitation found has always been the difficulty of getting a sufficiently bright source without increasing its area to an extent to interfere with its efficiency. A point source in a parabolic reflector would convert into an accurately parallel beam the light received on the whole area of the mirror from the source placed exactly at its focus.

The source is never a point and cannot be concentrated accurately at the focus and the beam ceases to be parallel so that the intensity at any point in it, other things being equal, diminishes. In the effort to get more and more powerful search-lanterns larger and larger reflectors have been designed and higher and higher current densities have been employed in the arc, but there has always been the limitation due to the temperature of volatilization of the carbon, which is practically reached in the light-giving crater so that increase of size does not produce a proportionate increase in illuminating effect. The crater is larger, to be sure, but not of materially increased specific intensity. What is wanted for maximum efficiency in the search-lantern is a lamp in which the specific brilliancy of the source is much increased without materially increasing its dimensions. Moreover, there has always been the trouble in large search-lamps of rapid consumption of carbon under the large currents used and the tendency to irregular burning of the positive electrode, both tending to displace the crater from the focal point and thus to interfere with the performance of the mirror.

The search-lantern described in this issue is ingeniously planned to meet the difficulties just mentioned. Use is made of a very high current density, from 120 amp to 150 amp in a positive electrode only 16 mm in diameter and a negative one even smaller, about one-sixth the area of those usually employed. The small dimensions are made practicable by directing a stream of alcohol vapor into the arc which ignites and burns with a non-luminous flame so much lower in temperature than the crater that it actually serves to cool the

exterior of the electrodes which are kept in revolution to insure steady burning and uniform cooling. The cooling around the electrodes keeps the arc central and reduces it to a small area of intense brilliancy. It is quite obvious, too, from the description of the lamp that use is made of a positive electrode with a mineralized core somewhat analagous in composition to that employed in white-flame lamps. Certainly one does not obtain a crater filled with snow-white fumes from an unmineralized electrode. It seems very probable that a large part of the effectiveness of the lamp is attributable to this mineralization which can be successfully utilized under the conditions of burning obtained. At all events the source of light in the new lamp is intensely brilliant and of very limited area; it can be kept quite accurately in the focus of the mirror and consequently gives a remarkably steady and intense beam. The light-giving area is perhaps no smaller than the area of maximum intensity in the ordinary search-lantern, but the specific brilliancy seems to be considerably higher. The result, therefore, is a beam which while not much more accurately parallel than that obtained from the best existing types is still of extreme brilliancy, its effective strength being said to be about six times as great as in the ordinary search-lantern operating at the same current. The improvement is of a most interesting character and seems to be highly satisfactory in its results.

Progress of the Electrical Contractors

Any electrical man who is pessimistic as to the business outlook should have attended the annual convention of the National Electrical Contractors' Association held in Detroit last week. Both in outward appearance and in private discussion the convention was an assemblage of optimists. Business was reported good or bidding fair to become so. The spirit, the atmosphere of the gathering was indeed refreshing. The leaders in the association are, and probably all members are becoming active, alert business men who constitute a tremendous asset in the electrical industry. Nearly all of the meetings were designated as "business sessions" closed to non-members. These star-chamber meetings of the association are rather inconsistent with that spirit of broad-mindedness, of co-operation, which we are all striving to foster in the various branches of the electrical industry. After all, what have the electrical contractors to conceal? The business is necessary and legitimate. It has relations with other classes of business men and with workingmen, of course; but is there any strategy comparable with the power of open, straightforward dealing? We have no doubt that all of the business transacted could well have been proclaimed from the housetops. Mists of prejudice are blown away by the breeze of publicity.

Many persons will be surprised to learn that the contractors adopted a "code of ethics"—a brief and simple set of recommendations as to business conduct, such as are usually confined to organizations of strictly professional men. Other important actions taken by the association were the declaration in favor of double-braid wire, the approval of the separation of electrical work from general contracting and the consideration of the possibility of national co-operation in supplying liability insurance for electrical contractors.

In attendance, in friendliness among business competitors, in sustained interest, the Detroit convention left little to be desired. The relations with central-station companies are more intimate, more satisfactory than in the past. The National Electrical Contractors' Association is now more influential and prosperous than ever before. It "made good" years ago, and it is now rounding out, learning, mellowing and expanding into one of the great electrical societies of the country, a fact that is highly gratifying not only to the members of the society itself but to all others engaged in electrical pursuits.

Temperature and Output of Electrical Apparatus

Until within recent years it was the almost invariable custom to measure the temperature attained by a loaded machine at some part or parts of its surfaces exposed to the air. But when machines are built for fairly high voltage the thickness and quality of the insulating walls on its conductors are such that a very considerable drop of temperature must occur within the walls. That is, the temperature on the inside of the insulation must be considerably higher than that on the outside near the external air. Hence the hottest spot in the insulation tends to be considerably hotter than those parts the thermometer can ordinarily reach. The introduction of thermocouples or thermo-coils into the inner recesses of coil windings is now a regular expedient available for large and expensive machines, whereby the hottest-spot temperatures may be indicated at the switchboard. The operator is thereby not only confidently apprised of the actual internal thermometric state of affairs in the machine, but he may also maintain, occasionally, loads considerably in excess of the rating, when the cooling air happens to be at a low temperature.

By experimental methods the central-station operator is led to perceive that the power capacity of a machine at any particular time, so far as relates to heating, may differ considerably from the rating, either above or below, and that the rating is the power capacity under conventionally assigned conditions as to hottest-spot and ambient temperatures. Great changes in opinion have manifested themselves recently among electrical engineers in these matters, largely as a result of investigations into the temperatures attained inside the windings of large machines. In recognition of these changes the standardization rules of the American Institute of Electrical Engineers have been revised to take effect Dec. 1, 1914. In the meanwhile manufacturers of electrical apparatus will rerate or redesign their machines where necessary to conform to the new rules which seemingly meet with universal approval.

The News of the Week

Activities and Events in the Electrical Field—Reports of Meetings—Commission Findings, Etc.

Movement of Mayors on Public Utilities

To carry out the plan for a conference of mayors advanced by Mayor Blankenburg, of Philadelphia as noted on page 4 of our issue for July 4, 1914, a convention will be held in Philadelphia on Nov. 12, 13 and 14. It is the plan to organize a National Bureau of Public Utilities Research. Mayor Blankenburg has asked the mayors of other cities to suggest speakers and subjects.

Ohio Convention Opens at Cedar Point

With a registered attendance of more than 200 members and guests the twentieth annual convention of the Ohio Electric Light Association opened at Cedar Point July 21. A full report will appear later.

In his presidential address Mr. J. C. Martin, Wilmington, Ohio, sketched the work of association committees during the past year and pointed to the constructive effort necessary for the coming twelve months. Reports were presented by the secretary and treasurer, executive committee, advisory committee, insurance committee and membership committee.

As the closing feature of the day's program the report of the illuminating committee, read by Mr. S. E. Doane, Cleveland, was enthusiastically received. It was discussed at length by Messrs. W. R. Powers, Huntington, W. Va.; Harry Schroeder, Harrison, N. J.; W. Culver, Cincinnati; Thomas F. Kelly, Dayton; L. C. Anderson, Franklin; J. C. Martin, Wilmington. At the close of the discussion Mr. Robert Hutchings, Dayton, presented a motion creating a committee to take up the question of standard distribution voltage as suggested in the report of the illuminating committee.

Boston Street Lighting Contract Situation

Mayor Curley, of Boston, has issued a statement advocating the acceptance by the City Council of the street-lighting contract offered by the Edison Electric Illuminating Company and pointing out that the attempted interference of labor interests on the ground that the Edison company is not unionized is entirely unwarranted. The Mayor said that the company's offer to furnish 6.6-amp magnetite lamps at a price of $87.53 per year each in place of the present price of $103.54 will save the city about $800,000 in the course of the ten-year contract, about 5000 lamps being involved. In addition, the contract provides that the company shall share with the city in the benefits of any further economies in lamp design, such as the possible substitution of nitrogen-filled lamps instead of arcs, should these prove desirable. At the offered price, the profit to the company would be about 6½ per cent on its street-lighting investment. The Chamber of Commerce, the Boston Finance Commission and its consulting engineer, Mr. Guy C. Emerson, an experienced street-lighting man, have not advanced the view that the offered price is unduly high, whereas an engineer brought forward by the union interests has already issued contradictory statements regarding the equitable character of the terms. Full provision for arbitration is offered. The Mayor's statement concludes with the vigorous observation that the municipal corporation should show that it possesses the business sense to conduct its affairs as would a private concern.

Booming the Export Trade

Mr. Alba B. Johnson, president of the National Foreign Trade Convention, has announced the personnel of the Foreign Trade Council. At the convention recently held in Washington a resolution was passed for the selection of a council. The first meeting of the council will be in the early fall in New York City, at which time it is expected that a committee will be appointed to co-operate with a committee of the Chamber of Commerce of the United States of America. The business of the council is to effect a co-operation for the extension of our foreign trade. Included in the list of members are the following men prominent in the electrical industry: Mr. Walter L. Clark, vice-president Niles-Bement-Pond Company, New York; Mr. Maurice Coster, foreign manager Westinghouse Electric & Manufacturing Company, New York; Mr. E. N. Hurley, president Hurley Machine Company, Chicago; Mr. M. A. Oudin, foreign manager General Electric Company, Schenectady, and Mr. John D. Ryan, president Amalgamated Copper Company, New York.

Phenomenal Patent Issue

During the week ended July 14 the United States Patent Office issued 907 patents, which is the largest number granted during any similar period in the history of the institution. The Patent Office receipts for April, May and June were also unusually large, being $601,137.67 for the quarter. During the fiscal year ended June 30, 1914, an average of about 1330 patent applications were filed and 690 patents were issued each week, while during the previous year 1310 applications were filed and 670 patents were issued weekly. It is interesting to note that during the first half of 1913 the average weekly issue of patents was 660 as compared with 730 for the same half of 1914. With the opening of 1914 approximately 31,900 applications were on hand in the Patent Office awaiting action, while on July 1 only 22,400 remained to be passed upon, showing for the six months a decrease of 9500 in the applications pending.

Anti-Trust Legislation

Considerable speed is being manifested in Washington official circles during the present week. On Wednesday the committee of the judiciary presented to the Senate its report on the Clayton anti-trust bill and the committee on interstate commerce finished its work of amending the Rayburn stock and bond bill, thereby practically completing the President's entire trust program. Commenting on the Clayton bill, Senator Culber-

FIG. 1—THE COURT OF HONOR AND THE 64-FT. ELK STATUE, ELKS' GOLDEN JUBILEE, DENVER, COL.

son, of the committee of the judiciary, stated that it is not proposed by the bill or amendments to change in any respect the original Sherman anti-trust act of July 2, 1890. The purpose is only to supplement that act and the other anti-trust acts referred to in section 1 of the bill. Broadly stated, the bill seeks to make unlawful certain trade practices which are not covered by the act of July 2, 1890, or other existing anti-trust acts, and thus to arrest the creation of trusts, conspiracies and monopolies in their incipiency and before consummation. Among other of these trade practices which are denounced and made unlawful may be mentioned discrimination in prices for the purpose of wrongfully injuring or destroying the business of competitors, exclusive and tying contracts, holding companies and interlocking directorates.

Elks' Jubilee Illumination at Denver

Unusual illumination features marked the Elks' Golden Jubilee held at Denver, Colo., July 13 to 18. Purple and gold, the order's colors, predominated in the thousands of lamps used to decorate the city's downtown streets. The great court of honor on Champa Street extended a distance of four blocks, from the "electric sunset" to the 64-ft. statue of a huge elk done in white plaster powdered with glass which sparkled in the rays of a number of powerful searchlamps and spotlamps. The curb-lines of the court of honor were flanked with 48 electric fountains, each bearing aloft the familiar Elks' clock symbol, as shown in Fig. 1. Green art glass formed the panels of the standards and above these were octagonal glass prisms within which water was sprayed from special nozzles forming a fog or mist which, as it floated away, resembled live steam. A 400-cp lamp at the top and a 200-cp lamp below provided the illumination for the water effects in each electric fountain.

The "sunset" structure at the other end of the court revealed a Rocky Mountain scene lighted by several thousand amber-colored lamps. Fifteenth Street was decorated with strings of 18-in. stucco stars each lighted by eight 20-cp lamps. On the other thoroughfares streamers of purple and yellow lamps were lavishly employed. The lighting for the Elks' jubilee was carried out under the direction of Mr. W. J. Barker, general manager of the Denver Gas & Electric Light Company, from designs prepared by Mr. George B. Williamson, illuminating engineer for the company, who also designed the notable conclave lighting of the previous year.

FIG. 2—STAR AND CLOCK STREAMERS ON FIFTEENTH STREET

FIG. 3—LIGHTING OF FOURTEENTH STREET AND AUDITORIUM

National Contractors' Association Holds Important Convention and Adopts Code of Ethics

Considered in all its aspects, the fourteenth annual convention of the National Electrical Contractors' Association of the United States, at Detroit July 15, 16 and 17, was the most important and enthusiastic the association has ever held. The attendance was about 455, consisting of about 215 members, 125 supply men and visitors and 115 ladies. Important business was transacted, including the adoption of a code of ethics and various declarations in relation to wiring practice. A number of important committee reports were presented. The whole atmosphere of the convention was most enthusiastic, and it was felt that the association had advanced to a higher plane as a result of the meeting. Four sessions were held, the first one being open, the others closed to non-members. A number of manufacturers made exhibits.

At the opening session of Wednesday morning, as noted in our issue of last week, Police Commissioner John Gillespie, of Detroit, welcomed the visitors and Mr. Freeman made an appropriate response.

Business, Wages and Employers' Liability

Mr. John Trix, of Detroit, president of the American Injector Company and vice-president of the National Association of Manufacturers, followed with a talk on business conditions. Among other things he said that perhaps the best contractor is one who can turn down a contract because it isn't right. The speaker suggested that the association say to the architects: "Write in plain English what you mean, and we will carry it out." As to the business outlook, Mr. Trix said that the prospect to-day is that the farmers will have the biggest crops in the history of the country. There is no reason why the country should not branch out into good business. The community has been in a business fog, as it were, and has been running under check. Mr. Trix discussed briefly the question of foreign competition. Foreign manufacturers are now enabled to sell machinery in this country more cheaply than can American manufacturers. Wages in Germany, for instance, are not more than 50 per cent of corresponding wages here. The United States is the only country where a workingman can afford an automobile. Whereas the average American workingman has two suits of clothes a year, the German mechanic must wear one suit three years.

Mr. W. N. Matthews, of St. Louis, reigning Jupiter of the Jovian Order, dwelt on the fact that Jovianism brings together all branches of the electrical industry. He mentioned that a correspondence course in electrical work is being planned for the members of the order.

Hon. John E. Kinnane, chairman of the Michigan Industrial Accident Board, gave a thoughtful address on workmen's compensation and employers' liability, especially as treated in the Michigan law on the subject. Twenty-two states are now working under compensation laws, and, although there are differences, all these laws are substantially alike.

Relations with Central Stations and Municipalities

Mr. T. I. Jones, general sales agent of the Edison Electric Illuminating Company of Brooklyn, and until recently chairman of the Commercial Section of the National Electric Light Association, addressed the convention at the business session on the afternoon of July 15. Mr. Jones discussed the relations of electrical contractors and central-station companies. He expressed himself as not in favor of selling appliances below cost unless for some special reason, in making a campaign for the selling of electricity, with which the contractors and dealers were well acquainted. Mr. Jones spoke frankly and without notes and made a good impression on the contractors. He urged his hearers to put their electrical merchandizing on a modern business basis. There was considerable discussion following Mr. Jones' address.

Report of Committee on Legislation

A number of committee reports were also presented. One was from the committee on legislation, of which Mr. Paul H. Jaehnig, of Newark, N. J., is chairman. This was a carefully prepared report in printed form. The committee has endeavored to collect all the state laws and city ordinances bearing on electrical work. Not all of these laws are working out satisfactorily. This is due partly to defects in the laws and partly to laxity in enforcement. Much remains to be done to secure ideal legislation. The committee made a number of suggestions in relation to proposed laws and ordinances. One is that the law should not attempt to create a monopoly for the electrical contractor, but should be framed so as not to restrict the freedom of those who wish to engage in the business. The committee says: "The licensing of electrical contractors is at present receiving much attention throughout our country, as it seems to be the only solution of certain abuses and weaknesses in the trade. One of the chief difficulties in obtaining uniformly good results in electrical construction work is the irresponsible contractor —one who has just sufficient knowledge of the business to be dangerous. He, through lack of knowledge of correct principles, the use of inferior material and poor workmanship, tends to create a life-and-fire hazard, instead of a safe installation." The compendium of laws in the report is valuable. It will be sent to any one interested.

Election of Officers

On the recommendation of a nominating committee of which Mr. W. C. Peet, of New York City, was chairman, officers were elected as follows: President, Mr. John R. Galloway, Washington, D. C.; first vice-president, Mr. J. C. Hatzel, New York City; second vice-president, Mr. W. L. Hutchison, Kansas City; third vice-president, Mr. John C. Rendler, Los Angeles; treasurer, Mr. James Hilton, Syracuse, N. Y.; secretary, Mr. George H. Duffield, Utica, N. Y.; sergeant-at-arms, Mr. J. C. Sterns, Buffalo.

Mr. Galloway, the newly elected president, has been the treasurer of the association for a number of years. It may be of interest to note that the treasurer's report, as presented at the Detroit convention, showed the largest balance in the history of the association. So well has Mr. Galloway conducted the finances of the association that he has been promoted to the highest office in the gift of the organization. He is a prominent electrical contractor in Washington, D. C., and a member of the Jovian Order.

Jovian Rejuvenation

At a rejuvenation and joviation of the Jovian Order held at the Detroit Board of Commerce Building on the night of July 15, a class of twenty-eight candidates was initiated. During the evening Mr. Martin J. Wolf, of St. Louis, made a strong plea for attendance at the annual meeting of the Jovian Order to be held in St. Louis Oct. 14-16. The degree team did excellent work. It was made up as follows: Jupiter, Mr. L. N. Pyle; Vulcan, Mr. J. M. Griffin; Neptune, Mr. F. M. McAdams; Mars, Mr. T. E. Lowe; Hercules, Mr. J. L. Turko; Mercury, Mr. H. C. Clarke; Pluto, Mr. W. O. Tiermann; Apollo, Mr. A. C. Ford, and Avrenim, Mr. J. T. Pearson.

Protection of Threaded Ends in Shipping Iron Conduit

At the Chattanooga convention of last year a Pacific Coast delegate called attention to the fact that where iron conduit is shipped long distances the threaded ends of the pipes are often badly damaged. A committee was appointed to see if the manufacturers could not be induced to make some form of protection. The greater number of manufacturers said that protecting the threads would necessitate an advance in price equivalent to about 2.5 per cent of the total price. One manufacturer, however, has devised a method of placing protectors, apparently fiber, on the conduit immediately after the pipe is threaded. This protects the threads until the sleeve is removed. This stripping can be done quickly. The association adopted a resolution expressing appreciation of the idea.

Mr. E. McCleary, of Detroit, chairman of the committee on National Electrical Code, made a report. One point he emphasized was that care must be exercised in wiring for the new gas-filled tungsten lamps. Some of these lamps take many amperes and there is no present provision in the code for incandescent-lamp wiring where such large currents are necessary.

Association Favors Double-Braid Wire

Mr. M. K. Foxworthy, of Indianapolis, said the association should discourage the manufacture of single-braid wire and should use its influence to cause manufacturers to make double-braid wire instead. This proposal caused much discussion. It was pointed out that single-braid wire is used in the wiring of small houses, where open work is allowed, and the cost of this class of wiring would be increased if double-braid wire is required. One estimate was that this increase would amount to $1 in the wiring of a cottage. The use of double-braid wire is compulsory in iron-conduit work, and the contractors say that where single-braid wire is also used there is danger of getting the two mixed. In practice the use of the two types of insulation seems to be a nuisance, and the association went on record as favoring double-braid wire only.

The association adopted officially as its standard the National Electrical Contractors' Association conduit and wire charts, previously described in the *Electrical World*.

Mr. S. E. Doane, chief engineer of the National Lamp Works of the General Electric Company, gave an illustrated lecture on "Observations of Central Stations and Contracting Conditions in Foreign Countries." Taking the contractor's point of view, Mr. Doane presented an account of his investigations into electric-service conditions in European countries. Practical information in relation to wiremen's wages and labor conditions was given.

The American Institute of Architects has adopted a resolution approving the segregation of electrical work from general contracting. Furthermore a bill, No. 14288, now pending in the House of Representatives, provides for this segregation on government work to a certain extent. The National Electrical Contractors' Association favors the plan and adopted a resolution advocating the passage of the bill mentioned.

San Francisco Next Year, New York in 1916

Mr. George W. Hill, of Utica, N. Y., made his report to the association as its special representative. Mr. Hill has been traveling in the Middle West and in the South, explaining the purpose of the association to electrical contractors and securing new members. He has been successful, and his report made a good impression.

Sometime ago it was decided that the 1915 convention of the association should be held in San Francisco. At the Detroit convention there was a good deal of campaigning in relation to the 1916 convention. A strong delegation was present from New Orleans to present the claims of that city. In the end the men from the Louisiana city withdrew gracefully in favor of New York, and it was voted to hold the 1916 convention in the latter city. New Orleans served notice, however, that it would expect the 1917 convention.

Adoption of a Code of Ethics

On the recommendation of a committee consisting of Mr. Joseph A. Fowler, of Memphis, and Mr. J. T. Marron, of Rock Island, Ill., the association adopted a "Code of Ethics for the General Guidance of the Members of the National Electrical Contractors' Association." This code consists of eight sections and is brief. Members are required to use every honorable means to uphold the dignity of their vocation. Not even under a customer's instructions should a member engage in any practice contrary to the rules safeguarding life and property. Public officials having in charge the enforcement of regulations of this character should be supported. Members should expose, without fear, dishonest practices of other electrical contractors.

PRESIDENT-ELECT J. R. GALLOWAY

Members should refuse to furnish estimates to general contractors "who do not regard bids as final and binding upon which they are awarded general contracts." The business reputation of a fellow member of the association shall not be maliciously attacked. After a member has secured a contract another member shall not attempt to supplant him. Where differences arise between members provision is made for arbitration.

Closing Business

Mr. E. J. Burns, of Rock Island, secretary of the Illinois Electrical Contractors' Association, told of the work which has been done by that association in reducing the cost of liability insurance. By a concerted effort a reduction of from 35 to 40 per cent has been obtained. Mr. Burns suggested the adoption of some form of national co-operation in securing liability insurance.

At the closing session Charles L. Eidlitz, of New York, the first president of the association, was made an honorary member. Mr. Eidlitz has retired from the electrical contracting business.

On accepting office, Mr. John R. Galloway, the new president, presented the official past-president's emblem of the association, a gold watch charm, to Mr. Ernest Freeman, the retiring president.

Mr. M. L. Barnes, of Troy, N. Y., past-president, addressed the association on behalf of the *National Electrical Contractor*, its official organ. Mr. Barnes spoke in terms of cordial praise of the work of Secretary George H. Duffield as editor of the monthly magazine.

Entertainment Features

There was a large attendance at the annual dinner held at the Hotel Cadillac on the evening of July 16. Mr. E. McCleary, of Detroit, was toastmaster and speeches were made by Messrs. John R. Galloway, of Washington, D. C.; John Trix, of Detroit; Robley S. Stearnes, of New Orleans, Joseph A. Fowler, of Memphis, and Ernest Freeman, of Chicago.

Friday, July 17, was observed as the birthday of the association. There was a forty-three mile automobile ride in the forenoon and a steamboat ride and outing in the afternoon and evening. Other entertainment was provided for the ladies during the convention.

Convention Notes

On the night of July 14 the Chicago electrical contractors gave a rendezvous entertainment in the Oak Room of the Congress Hotel, Chicago, for members and visitors who gathered at that point to proceed to Detroit. A party of thirty-five ladies and gentlemen sang, listened to music by professionals and partook of refreshments while waiting for train time. The Chicago men took charge of all train, baggage and hotel arrangements. Mr. Joseph N. Pierce, of Chicago, looked after things generally.

The *Detroit Free Press* of July 15 issued a "Convention Number" supplement. It contained articles and portraits relating to electrical contractors and the electrical industry, also a number of advertisements of electrical concerns.

A fine example of exterior "flood lighting" by the use of the new gas-filled tungsten lamps was the special illumination of the lofty Dime Bank Building with the aid of seventy-three 1000-watt units contained in special reflectors. The lamps were installed on surrounding structures and lighted three sides of the glistening white bank building. Messrs. Ward Harrison and H. T. Spaulding, of the engineering department of the National Lamp Works, Cleveland, Ohio, arranged this novel flood-lighting installation.

As already noted, about four hundred men attended the complimentary luncheon given July 15, by the Detroit Jovian League to visiting contractors, Jovians and other electrical men. Statesman J. M. Griffin, of Detroit, presided, and Major Robley S. Stearnes, of New Orleans, performed the duties of toastmaster very acceptably. Speeches were made by Messrs. Ernest Freeman, Chicago; Ernest McCleary, Detroit; W. N. Matthews, St. Louis; M. Frank Knapp, Pittsburgh; H. E. Niesz, Chicago; James R. Strong, New York; Sam A. Hobson, Chicago; George W. Hill, Utica, N. Y., and Joseph A. Fowler, Memphis, Tenn.

The report of the committee on legislation, of which Mr. Paul H. Jaehnig, of Newark, N. J., is chairman, is elaborate, consisting of 96 closely printed double-column pages. An effort has been made to collect all the state laws and city ordinances bearing on electrical work, particularly the licensing of electrical contractors.

Arkansas was represented by several delegates who were conspicuous by bright yellow ribbons bearing the name of their state in large black letters.

The Detroit contractors were hospitable and attentive. Mr. Ernest McCleary was convention chairman of the Michigan Electrical Contractors' Association and Mr. L. W. Eddy was local chairman.

Massachusetts and California, Minnesota and Texas, and nearly all the states between, were represented in the attendance, which was indeed notably representative.

Before the Jovian rejuvenation on Wednesday evening there was a street parade. The degree team headed the line in carriages, but the common or garden variety of Jovians were made to march lock-step. The spectators appeared to enjoy the sight.

Secretary Duffield was certainly one busy man. It was rather warm in the convention hall (the New Orleans men said they were almost prostrated by the Detroit heat), but George was always "on the job" there and elsewhere.

Errors in Meter Readings Subject to Correction

The New Jersey Court of Errors and Appeals has recently handed down an interesting decision in the case of the Borough of Vineland, operating an electric plant, against the Fowler Waste Manufacturing Company. The borough furnished the company with electric energy for its business, and rendered bills from June, 1910, to May, 1912, for $867. It was later found that the meters had been misread during this period through failure to multiply the face readings by the constant 10, and that the actual value of the energy used was $5,243, which, with discounts, resulted in a net sum of $4,375.

In its suit to recover this sum the borough was sustained by the Cumberland Court and the Supreme Court, and now, upon appeal, by the Court of Errors and Appeals. In its defense the company held that the plaintiff had free access to the meters, that bills were rendered monthly and it was given a receipt in full for the energy used, and that the plaintiff should be bound by its own error. It was further argued that the defendant company had based the selling price of its goods upon the amount actually charged for energy, and if it were obliged to pay ten times as much it would be the loser by that amount.

The borough held that there was no misrepresentation or concealment, but simply an innocent mistake. In handing down its decision in favor of the borough, the Court of Errors holds that the claim of the company as to loss of fixed selling price was contradicted by the company in its claim that it sold its products at the highest price obtainable, and that at the end of two years it was in charge of a committee of its creditors.

Water-Power Regulation in British Columbia

The British Columbia water act of 1909 has lately been amplified by a set of "Rules and Regulations" which specify and explain the legal procedures necessary in acquiring and developing government water-powers and also establish a new system for the collection of revenue from the users of such powers.

The new rules and regulations cover matters which were only partly provided for in the water act of 1909 and go into full detail in regard to (1) petitions and fees, (2) expropriation by municipalities, (3) the use and occupation of crown lands, (4) fees for the use of water for domestic, irrigation and other purposes, (5) fees for the use of water in the development of water-power, (6) headgates, structures and measurement of water, and (7) the filing of plans, office procedure and fees.

Under these several headings a new policy has been laid down which will make a radical change in the administration of provincial water rights. The comptroller is vested with judicial authority in settling questions and disputes, while the Executive Council can order a license revoked in certain cases, such as a re-

fusal or failure to develop the full amount of power covered by the license within a period of five years after there is a public demand for such power. However, the outstanding feature of the new policy is in the manner of determining the fees, which will from now on be based on the capacity of the site as measured by the net horse-power which can be produced at 70 per cent efficiency.

In order to exclude at the outset all who are not bona fide investors, a substantial sum is required as a record or application fee. A bond is also required varying from 50 cents to $2.50 per hp as the total power of the site decreases from 100,000 hp to 1000 hp. It is not to be less than five times the amount of the record fee. All rental payments made during the survey-construction period are rebated to the licensee as credit upon the rental account in the operation period, this being designed to lessen the expenses of early operating periods, as well as to hasten the completion of the plant. The amount of the rental fee during the operating period, which fee is fixed by the board of investigation, is in no case to be less than 25 cents nor more than $1 per hp per annum.

Tentative Rules for Service Standards in Illinois Discussed at Springfield

At a meeting at Springfield, Ill., July 16, members of the Public Utilities Commission of Illinois, the commission's engineers, and representatives of electric and gas utilities of the state participated in an open discussion of rules suggested by the commission for establishing standards for electric and gas service in Illinois. At the opening of the meeting Commissioner Walter A. Shaw, who presided, announced that no action or statement of the commission made at this session would be considered as binding, since the meeting was called primarily that the commission might receive the ideas and learn the viewpoints of the utility operators. Suggestions and additions to the proposed rules, said he, would be welcomed and would be given fair consideration.

Passing at once to the sections dealing with electric service, Rules 15 and 16, declaring against "creeping" meters and placing the allowable error for an electric meter, between one-tenth load and rated load, at 4 per cent, were read and accepted without objection or comment.

Small Company Representatives Present Views

Rule 17, providing that each watt-hour meter shall be checked for correct connection, mechanical condition, suitable location and accuracy within thirty days after installation, was criticised by Mr. Elmer W. Smith, of the Kewanee (Ill.) Light & Power Company. Stating that he spoke from the standpoint of the small company Mr. Smith said that the thirty-day limit should be raised to sixty days to allow more of these tests to be made by a single man in one trip. Where there is no regularly organized meter department an extension to sixty days would lighten the burden of this work. In reply to a question propounded by Mr. R. M. Feustel, chief engineer for the commission, Mr. Smith said he was unable to express an opinion on the advisability of classifying companies as to the number of customers under this rule. Mr. A. D. Mackie, Springfield, stated that a thirty-day rule would work no hardship upon the Springfield Railway & Light Company.

The advisability of periodic tests of meters of different ratings and dates of manufacture, stipulated under Rule 18, was questioned by Mr. C. E. Schutt, supervisor of the light and power department of public service of the city of Chicago. Mr. Schutt stated that the portion of the rules requiring meters of the same rating but of different date of manufacture to be tested at differing intervals, would lead to practical difficulties in execution. Mr. Feustel replied, however, that in this case utilities probably would test all meters of identical type at the shorter period to save confusion. Rule 19, covering meter test records and meter records, was passed without comment.

Working Standards and Referee Tests

Following a question by Mr. John Maury, Rossville, Mr. S. P. Farwell, an engineer for the commission, gave his opinion that Rule 20 should be changed to read, "Each utility furnishing metered electric service should have available" [instead of "own"] "suitable working standards"—so that two or more small companies might use the same meter. Rule 21, declaring that a company shall test meters at the request of the customer, was passed without question. Although there was no objection to Rule 22, fixing fees for referee tests made by an inspector employed by the commission, Mr. C. E. Schutt, of Chicago, recommended that an additional paragraph be appended providing for the adjustment of bills following the discovery of a fast meter. Meter readings on bills, interruptions of service, and records and reports required by these rules were taken up in Rules 23, 24 and 25 and created no objections.

It was the intention of the commission in framing Rule 26 that any prospective customer should be entitled to a maximum free line extension of 200 ft., if necessary. Beyond this free limit it was intended that the customer should deposit with the electric-service company an amount equal to the cost of the additional extension, the company agreeing to pay rebates to the original consumer as additional customers were taken on the extension. However, the question brought up by Mr. John Maury, Rossville, showed that with the present wording the company might be called upon to build 400 ft. of line for a single customer. An additional suggestion made by Mr. Harry E. Brown, vice-president of the Spring Valley Gas & Electric Company, provided that the rule should carry a one-year contract feature. He also asked whether the company would have to build a line extension for a man with poor credit. To this query Mr. Feustel replied that the existing rules of a company governing service extension deposits should cover such cases.

Suggestions by Chicago's New Department of Public Service

Representing the department of public service of the city of Chicago, Mr. C. E. Schutt also offered a revised rule to take the place of Rule 26. The reasons given for objecting to the former rule were that in it no recognition was taken of the diversity of types of customers, or of the comparative value of service, or the comparative value of the return. Moreover, the rule provided no means for returning the investment of an isolated customer upon whose extension no future customers might be connected. In this connection Mr. Montague Ferry, commissioner of public service, Chicago, said that the city is now renting about 1100 arc lamps from the Commonwealth Edison Company, and with the present wording of the rule the city would be required to deposit with the Commonwealth company about $100,000 for these extensions.

Rule 27 specifies that "each electric utility operating in a city having a population of 1500 or more shall adopt a standard voltage for the entire constant-potential system and shall maintain the voltage within 3 per cent of such standard on all lighting circuits during lighting hours." To this provision Mr. Peter Junkers-

feld, assistant to the second vice-president of the Commonwealth Edison Company, Chicago, objected on the ground that regulation within 3 per cent to every customer was a difficult stipulation. Three per cent as an average, he said, was fair; but under the stipulations of the rule cases might arise where the business of a large consumer would have to be temporarily refused in order to comply with the spirit of the rule. Especially would this condition be true among the smaller companies where the addition of a large customer might temporarily affect a portion of the constant-potential system.

Following the reading of Rule 28, providing for voltage surveys, on which there was no comment, Mr. Farwell asked for an expression of opinion on additional rules regarding customers' deposits, grounded secondaries and frequency variations. In reply to the latter two questions Mr. Junkersfeld said he believed electrical men generally agree upon the advisability of grounding secondaries but differ somewhat as to methods. On the question of frequency variation he stated that any provision for close regulation of frequency would tend to bring the same result as close voltage regulation and might prohibit the small companies from taking on large customers without expensive preparations.

Discussion of the electrical rules was short and there seemed to be a tendency on the part of the commission to consider every suggestion made. Although a fairly large representation of electric-utility men was present, few took part in the discussion.

Mexican Northern Waterpower Plant to Be Ready This Fall

With the settlement of Mexico's internal troubles in sight and the resumption of operations in a number of mines in its vicinity, the 50,000-hp Santa Rosalia hydroelectric plant of the Mexican Northern Power Company (which is the subject of an illustrated article on a following page) is now to be pushed to completion, and it is expected that the station will be ready to supply energy by September or October of this year. Mines and other industries in Chihuahua in the vicinity of the partially completed water-power plant are already starting up, and by the time the new station is ready for operation it is believed that a large market for energy will be available. As noted in the article already referred to, work on the water-power plant has been suspended since October of last year. Floods during the last twelve months have, however, filled the reservoir until now a body of water 30 miles long by several miles wide has been formed. When the plant was abandoned last fall the hydroelectric machinery had already been installed and the transmission line was nearly completed.

PUBLIC SERVICE COMMISSION NEWS

California Commission

The Railroad Commission has rendered a decision in the complaint filed by the town of Antioch, Contra Costa County, against the Pacific Gas & Electric Company. The complaint charged that the company's rates for electricity for general domestic and commercial use and street lighting were unreasonable. In arriving at its decision, the commission made an investigation of the company's entire hydroelectric system, and its steam plants as well as its local distributing system at Antioch. The company held that it should be allowed a return on the basis of the cost to reproduce its plant new plus an allowance for going-concern value. In figuring the basis of return, the commission reduced the overhead percentages to be added for administration, taxes, insurance, etc., from about 25 per cent, as estimated by the company's engineers, to about 12 per cent. The commission then fixed an average cost for electric energy deliverable at substations. At the hearing of the case it was agreed by the company that the basis fixed in this decision might be used as the basis upon which to ascertain the cost of energy delivered to any of the cities which it serves, and in fixing rates hereafter it will only be necessary for the commission to determine the cost of distribution in any locality. This average cost as found by the commission is 0.7312 cent per kw-hr.

Idaho Commission

The Public Utilities Commission of Idaho is under attack. The republican and democratic State conventions have inserted planks in their respective platforms providing for the amendment of the utilities act.

It is said by those who are familiar with the intent of the republican plank that it means a declaration for an amendment to the utilities act that will take from the commission power to require companies to apply for certificates of public convenience and necessity before competing in districts where corporations are operating and reasonable rates prevail.

The democratic platform says in part: "The law has been interpreted by the republican commission and affirmed by the Supreme Court of the State of Idaho as giving the commission sole and autocratic power to permit existing public utility monopolies to continue their exclusive possession of the market supplied by them; competition is killed; the needed and desired development of Idaho's natural resources is blocked and discouraged. We condemn this substitution of three men commission rule for the public policy of competition and development of natural resources. We pledge the democratic party to such changes in the public utilities law as will secure regulated competition in place of protected monopoly."

Illinois Commission

The commission has given authority to the East St. Louis Light & Power Company to change rates on installations of 500 hp or over where the customer will agree that the company will not be required to furnish energy during the time of maximum demand of other business on the company's lines. The rate in this case is fixed at about one-half of the regular rate.

Massachusetts Commission

The Massachusetts Gas & Electric Light Commission has ordered a reduction in various prices of electric energy by the Northampton Electric Lighting Company, acting upon two petitions addressed to the board by Mayor W. H. Feiker. The company is one of the properties of the Massachusetts Lighting Companies, whose headquarters are in Boston. At the hearings the company offered to reduce its maximum net price from 14 cents to 12 cents per kw-hr. to private customers, and offered yearly prices for street lighting, with its existing installation, of $85 for all-night and $71 for midnight-early-morning arc lamps, and $24 for all-night and $18 for midnight incandescents. The arc lamps in service at the close of the 1913 fiscal year were 106 6.6-amp, alternating-current inclosed units, there being 498 50-watt tungsten street lamps in operation. Under the existing prices the company charged $90 per year for each arc lamp lighted all night and every night, or 4000 hours per year, and $70 for each arc lamp used until midnight, or 2250 hours yearly, with an additional charge of $5.56 per lamp for each midnight arc lamp

operated from 5 a.m. to daylight between Nov. 15 and March 1. The prices for the incandescent lamps were $19 and $28 per lamp per year, respectively, with an additional $1.51 for early morning service. On Main Street, by agreement with the company, the city and the Board of Trade, twelve arches carrying 208 50-watt tungsten lamps have been operated every night until 11 p.m. for $1,200 a year.

The board points out that since 1888 the company has failed to pay dividends in only two years, and has paid less than 6 per cent in but seven years. In 1902 it began paying regularly 8 per cent and in 1906 10 per cent, and in only one year since has it paid less than 12 per cent and in some years a much higher rate. Its earnings have been ample to make good in renewals and extensions all the depreciation which has occurred. On June 30, 1913, the company had a plant with a book value of $216,278, with other assets of $78,017. At the hearings some stress was laid upon the need of early additional outlay for station expansion and underground construction. In the face of this the company declared an extra dividend, which, with other available funds, would have met most of the cost of these projected improvements. Although the annual dividends in the last five years have averaged in excess of 20 per cent, the earnings in excess of operating expenses, interest and dividends have exceeded $19,000 a year. The board is therefore convinced that the prices given below will allow earnings ample to cover all reasonable operating expenses, including a proper provision for depreciation and a fair return on the value of the property.

Since the hearings the company has adopted a somewhat simpler motor-service schedule with a lower base price, which the board considers will be advantageous to both the company and its customers. It seems undesirable to the board to deal specifically with any prices other than those for street lighting and the maximum net price to commercial customers. The commission says: "Other prices both for power and light are made chiefly from motives of commercial expediency to obtain business which cannot otherwise be secured. To the extent to which such business is strictly competitive it is able to take care of itself and needs no help from this board. . . . While the minimum charges for power in force may in some instances work some hardship and might perhaps be rearranged to advantage, and while they have little value to the company as producers of actual revenue, they tend to make a fairer adjustment of the responsibility for station loads as between customers and should lead to decreasing average costs and to lower prices. For these reasons the board has not deemed it necessary to make any specific recommendations with regard to such minimum charges." No recommendation is made regarding the arch display lighting, as the commission notes that this is governed by special agreement and at a rate as low as the board under the conditions would care to recommend.

The board orders the company to establish a maximum net price, dating from July 1, of 9 cents per kw-hr., with a price of $82 per year for all-night arc-lamp service and a price of $68 for midnight and early-morning lamps, and a price of $17 per year for all-night and of $13.50 for midnight-daylight incandescent lamps.

New Hampshire Commission

The Public Service Commission of New Hampshire has prescribed a classification of accounts for electric utilities effective as of July 1, 1914. The text issued for electric utilities classifies the companies into four groups on the basis of their gross earnings. For the smallest companies, those which have been grouped as having annual earnings of less than $3,000, there has been provided a very much condensed set of instructions as an appendix to the regular rules.

The general instructions regarding the classification require that each electric plant serving a distinct locality, and separately operated, shall be considered a separate utility even though two or more plants are held in common ownership. Plants connected by transmission lines, but otherwise separately operated are, however, considered separate plants, unless in any case upon application and for good cause shown the commission shall permit it to be treated as a single operating unit. Overhead expenses common to several plants held in common ownership may be distributed to the several plants, but the distribution must be made upon an equitable basis and such basis must be reported to the commission. Companies owning plants separately operated are required to show the stock, bonds, notes and other securities issued to acquire or improve the properties of each plant. The commission requires the keeping of accounts for the utility as a whole, showing the aggregate plant investment, the liabilities of each class and the operating expenses and revenues thereof, together with all financial transactions between the utility as a whole and each separate plant regarded as a separate utility.

The commission indicates the probability that it will be compelled to make a further and more explicit requirement in particular cases. Under the provisions of the New Hampshire law no public utility is permitted to transfer or lease its property or contract for its operation without the assent of the commission. By virtue of this provision the commission has at hand information of the value of plants when purchased and there has accordingly been inserted in the classification the provision that when any property in the form of a going and completed plant is purchased, the actual amount paid therefor shall be distributed to the appropriate accounts of the purchasing utility; but before such distribution is made the plan thereof must be approved by the commission. The method of treating the "cost of plant as of July 1, 1914," the date upon which the classification went into effect, differs from the procedure adopted in other classifications. The utilities are given their option of either bulking the total property of the company devoted to its operation or of allocating it to the various investment accounts. If the latter course is adopted by any utility it is provided that the charges shall be so designated upon the books of the utility as to show clearly that they relate only to property installed prior to the close of that date.

The policy adopted by the utility of considering discount on securities as an item not generally chargeable to property has been incorporated in the classification. It is provided that this discount must be in no case be charged to property accounts without authority.

The amount of sales as compared with the energy produced was considered one of the principal factors tending to disclose efficiency. This is manifested in the provision for accounting uniformly for the amount of energy used by the company. An account to show the energy used by the company must be opened as a credit to the total cost of production. The corresponding debit to this credit is to be made to the various expense accounts where the current is used. This provision differs from the New York classification which has the account "duplicate charges" to contain the credit for all energy used by the company.

"Lamp renewals" and "inspecting and testing meters" are considered as operating rather than maintenance charges; "uncollectible accounts" are made a commercial expense and "profit on merchandise sales and jobbing" are classified as non-operating revenues.

Current News Notes

NASHVILLE TO HAVE AN ELECTRIC SHOW.—An electric show will be given in Nashville, Tenn., on Sept. 21-26 by the Nashville Jovian League. The co-operation of all electrical men is requested. Jovian Day will be celebrated on Sept. 24.

* * *

LOUISVILLE PUBLIC SCHOOLS TO TEACH WIRING.—Courses in electric wiring have been included in the curriculum of the Louisville (Ky.) pro-vocational schools by the local board of education which has ordered that the annex to the Board's administration building be fitted up and equipped for instruction of this kind.

* * *

DRYING GRAIN BY ELECTRICITY.—A milling company in Europe is reported to be using electricity for drying the grain prior to its being ground. The heating unit is inclosed in the spiral screw which conveys the grain from the hoppers to the grinding stones. Drying the grain before grinding is said to make the grinding easier and to insure obtaining a better quality of meal.

* * *

LECTURE ON ELECTROMAGNETS BEFORE ANNAPOLIS POST-GRADUATE SCHOOL.—Mr. Charles R. Underhill, electrical engineer of the Acme Wire Company, New Haven, Conn., delivered a lecture on electromagnets before the officer-students of the Naval Post-Graduate School at the United States Naval Academy, Annapolis, Md., July 15. A number of officers and instructors attended the lecture, in the course of which lantern slides and actual electromagnets of various forms were exhibited.

* * *

ELECTRIC-LIGHT CURE FOR SURGICAL TUBERCULOSIS.—The head of the Finsen Light Institute of Copenhagen has used the electric arc light in the treatment of patients suffering from surgical tuberculosis with promising results. The patients are placed about a yard from an ordinary arc lamp. At the beginning the exposure lasts for fifteen minutes a day, but it is gradually increased until it reaches two and one-half hours. It is expected that treatment by artificial light in many cases will give better results than prolonged and expensive treatment by sunlight.

* * *

GROUNDING OF FIRE-ALARM BOXES.—The United States Bureau of Standards is co-operating with the grounding committee of the International Association of Municipal Electricians on the subject of grounding fire-alarm and police-signal boxes. Several fatalities have recently occurred due to ungrounded boxes and have shown the necessity for this form of protection. Many fire chiefs, however, oppose the practice of grounding on the score that the box ground too frequently renders the signal-box mechanism inoperative owing to insufficient insulation between the box and the working parts. The subject will be discussed at the municipal electricians' convention to be held at Atlantic City, N. J., Sept. 15 to 18.

* * *

WIRELESS CONTROL OF FOG SIGNALS.—Along the coast of England signal guns fired by Hertzian waves are being used during fogs to warn passing vessels of impediments to navigation. These guns when once started by the Hertzian waves continue to fire (unless stopped by the same means) at intervals of about twenty seconds until the supply of acetylene gas operating them is exhausted. Tanks containing enough gas to operate the guns about two or three weeks are installed near each gun. The function of the wireless control is to enable attendants in the coast guard stations to start or stop the operations of these fog guns from a distance, thereby eliminating the necessity of personally visiting the apparatus except to renew the charge of acetylene gas.

* * *

NAVIGABILITY OF DESPLAINES RIVER.—Argument has been resumed before the Supreme Court of the United States in the case brought by the State of Illinois to restrain the Economy Light & Power Company of Joliet, now a part of the Public Service Company of Northern Illinois, from building a dam in the Desplaines River at Dresden Heights, Ill. The site of this proposed hydroelectric development is near the point where the Desplaines and Kankakee Rivers come together to form the Illinois River. Work was begun a number of years ago, but on the ground that the Desplaines River was and is a navigable stream the State of Illinois brought suit to prevent the building of the dam. The State was defeated in the state courts, and the case is now pending in the United States Supreme Court. Counsel for the company contends that no interest will be injured by the building of the dam, and that there is no reason why this considerable water-power should go to waste.

* * *

SOCIETY MEETINGS

ELECTRICAL SUPPLY JOBBERS' CONVENTION.—The Electrical Supply Jobbers' Association will hold its next convention at Niagara Falls, Canada, with the Clifton Hotel as headquarters, from Sept. 9 to 11. Mr. Franklin Overbagh, 411 South Clinton Street, Chicago, is secretary of the association.

* * *

CONVENTION OF ELECTRIC VEHICLE ASSOCIATION.—The fifth annual convention of the Electric Vehicle Association of America will be held at Philadelphia October 19, 20 and 21. Coincidently with the convention the Philadelphia Electrical Show will exhibit displays of a number of electric passenger and commercial cars.

* * *

MAINE ELECTRIC ASSOCIATION.—The Maine Electric Association will hold its annual meeting at the Falmouth Hotel, Portland, Maine, Friday, July 31. Following the business session at 3:30 p. m., cars will be taken to the Cape Cottage Casino where a shore dinner will be served. Mr. W. S. Wyman, Central Maine Power Company, Augusta, is secretary-treasurer of the association.

* * *

SOUTHEASTERN SECTION, N. E. L. A.—The Southeastern Section of the National Electric Light Association will hold its 1914 convention at the Isle of Palms, near Charleston, S. C., Aug. 19, 20 and 21. Mr. W. W. Fuller, general superintendent of the Charleston-Isle of Palms Traction Company, may be addressed concerning accommodations. Mr. T. W. Peters, Columbus, Ga., is president of the section and Mr. A. A. Wilbur, Columbus, Ga., is secretary-treasurer.

* * *

JOVIAN OUTING AT DAYTON.—Fifty Dayton (Ohio) Jovians held an outing July 15 at Tecumseh Park near Dayton. Baseball and field sports were followed by a general swimming party and chicken dinner. The committee in charge of the occasion comprised Messrs. C. B. Frankel, H. Maxwell, G. A. Niehaus, C. W. Hosier, C. H. Swartz, H. E. Allen, J. P. Martin, James Atwood, H. H. Wollaston, D. B. Howland, C. R. Bishop, G. B. Sayre, F. K. Bybee, E. O. Waymire, B. S. Guitteau, C. Fichter and Thomas F. Kelly. The Dayton Jovians plan another outing for Aug. 22.

Hydroelectric Construction in Northern Mexico

Difficulties encountered in building a 50,000-hp. electric station in Chihuahua—Personal experiences of American engineers in leaving the war-ridden country to the south. By A. C. Hobble

DURING the last three years the Mexican Northern Power Company, Ltd., has been constructing a 50,000-hp hydroelectric project near Santa Rosalia in the northern state of Chihuahua, Mexico. When completed, this power station will supply electrical energy to numerous gold and silver mines in the region adjacent to the city of Parral. Construction work during almost the entire period has been carried on with the greatest difficulty owing to the continued series of revolutions interrupting railway traffic and making it next to impossible to secure cement, lumber, coal and other much needed supplies. Enduring these interruptions and inconveniences at first, the Mexican Northern Power Company finally found it necessary to suspend all construction work when the project was nearing completion.

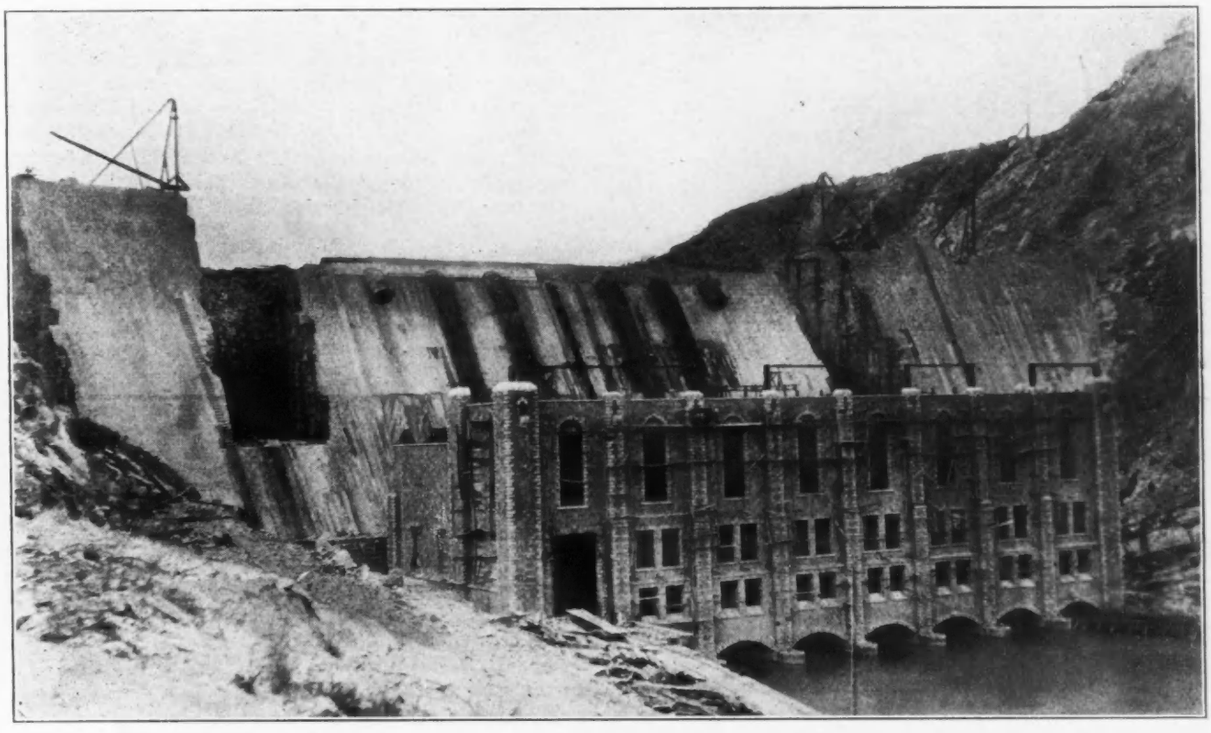


FIG. 1—DAM AND POWER HOUSE NEAR SANTA ROSALIA, CHIHUAHUA, AS THEY NOW APPEAR

The River, the Dams and the Station

The project itself involved the construction of a concrete dam—about 250 ft. high, with a maximum length of over 800 ft.—across the outlet mouth of the Rio Conchos River Canyon at La Boquilla, and a subsidiary masonry dam across a dry valley. The latter dam is practically completed and is over 2600 ft. long, with a maximum height of approximately 110 ft. Hydraulic cement, made from local deposits of blue limestone and clay, was used in its construction.

Extending across the Conchos River Canyon, the former concrete dam was more than half completed when work was suspended about the first of October, 1913. When this dam is completed a storage reservoir or lake some 56 sq. miles in area will be formed. The water of the Conchos River will be backed up some 30 miles, giving the river an average width of about 2 miles. The accompanying photographs show the dam during coarse of construction and the present status of both dam and power house.

During the year 1912 the total discharge of the Rio Conchos was 33,737,550,000 cu. ft., the maximum discharge occurring in August and September, aggregating for the months 13,236,650,000 cu. ft. and 12,140,-100,000 cu. ft. respectively. Although the minimum discharge of the river sometimes falls as low as 350 cu. ft. a second, the variation in flowage is well compensated for by the immense storage lake with a capacity of 100,000,000,000 cu. ft.

The power house is a steel structure with walls of hard blue limestone and is built on massive concrete foundations in the bed of the river directly in front of, and forming a part of, the dam. Designed for six 10,000-hp units, of which three are installed ready for operation, the power house represents a considerable undertaking. The turbines are of the horizontal, double-runner, central-discharge, reactive type, built by Messrs. Escher, Wyss & Company, of Zurich, Switzerland. Oil-pressure governors are supplied with the

necessary oil by duplicate oil pumps driven by impulse wheels.

All electrical apparatus in the power house, including 6250-kw, 4000-volt, sixty-cycle, three-phase generators, exciters, 2500-kva oil-cooled and water-cooled transformers, 4000-volt low-tension apparatus and 110,000-volt high-tension apparatus, was supplied by the General Electric Company.

Transmission Lines and Temporary Equipment

Transmission lines to Parral, 50 miles distant, consist of No. 0000 aluminum cable supported by suspension insulators on 74-ft. double-circuit steel towers. The standard spacing is 650 ft., but the longest span measures about 1000 ft. Aluminum cable is used because of lesser first cost as compared with copper at the time of purchase, and also owing to the reduced corona loss.

Perhaps the most interesting feature of the project from the electrical engineer's point of view is the 2000-kw electric construction plant, which, though temporary, is modern in its equipment. One 1000-kw and two 500-kw Curtis steam turbines, operating condensing, are supplied with superheated steam from one Babcock & Wilcox water-tube boiler and two horizontal tubular boilers, the former using crude oil for fuel and

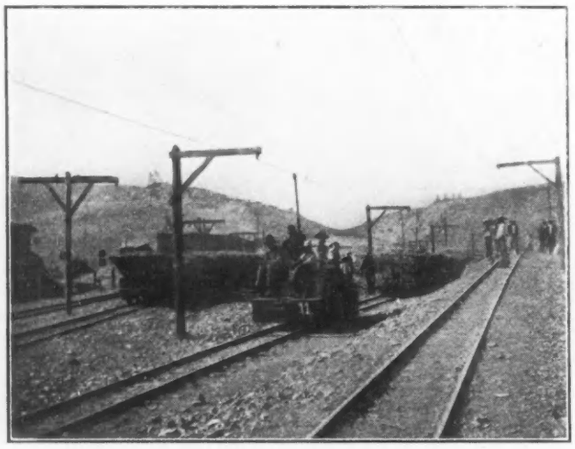


FIG. 2—ELECTRIC-RAILWAY HAULAGE ON THE RIO CONCHOS PROJECT

the latter coal or wood. Owing to demoralized traffic conditions there was a long period of time when oil and coal could not be obtained and it was necessary to fire the boilers with wood hauled long distances across the cactus and mesquite-covered desert.

Practically all operations were electrical, more than 3000 hp in electric motors being installed to drive air compressors, stone crushers, concrete mixers, lime and sand screens, clay mills, four 150-hp Lidgerwood cableways operating across the canyon, hoists, stiff-leg derricks, pumps, channeling machine, workshops, ice plant, mine locomotives, etc. Approximately 5 miles of narrow-gage electric railway distributed sand, gravel, cement, lumber and other materials where required.

At least twelve electric mining-type locomotives were used to haul materials for construction to different parts of the job. One line of railway had to be constructed along the side of a mountain, climbing an elevation of about 300 ft. in a distance of approximately a mile. These locomotives were kept busy night and day in perhaps the most rigorous service—other conditions also being considered—that such locomotives have ever been called upon to perform.

General distribution was effected at 2300 volts,

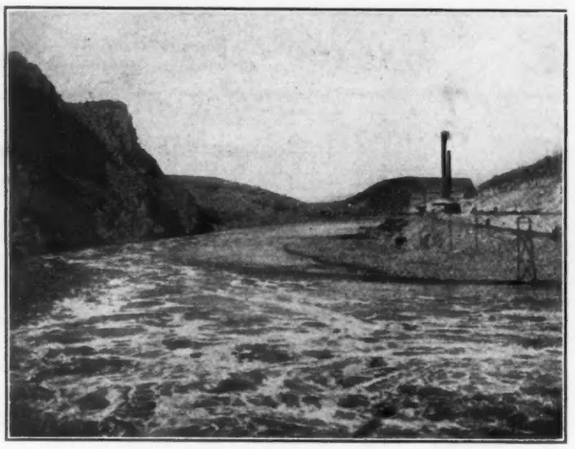


FIG. 3—RIO CONCHOS IN FLOOD—STEAM-ELECTRIC CONSTRUCTION PLANT IN DISTANCE

transformers stepping down the potential to 220 volts for alternating-current motors. Distribution lines to electric railways and Lidgerwood cableways were operated at 550 volts and were supplied with energy from two 300-kw rotary converters.

Work on the dam was carried on night and day. Ordinary illumination by means of arc lamps would not suffice, as these would be destroyed by blasting, by the movements of concrete skips from the cableways over the top of the dam, and by the swinging members of the stiff-leg derricks. However, this difficulty was solved by using five 18-in. projectors, or searchlamps, mounted at high points on both sides of the canyon several hundred feet distant from the dam.

War in Camp

About 2500 Mexicans were employed as laborers on this work. The field and office staff included about 100 foreigners, about seventy of these being Americans and the others Europeans. Owing to the continual excitement and disorder brought about by the revolution, Mexican laborers were especially hard to handle. At one time a battle between the forces of General Villa and the Federals was fought in the construction camp, and of course all work during the battle was suspended without orders. In this fight twelve combatants were killed and some forty were wounded. Little damage, however, was done to the property of the Mexican Northern Power Company. During one period, when General Villa was in camp with 500 followers, several horses belonging to the company disappeared unaccountably. Appealing to the general, it was discovered that the horse thieves were among Villa's army. Summary measures were taken, and, discovering the

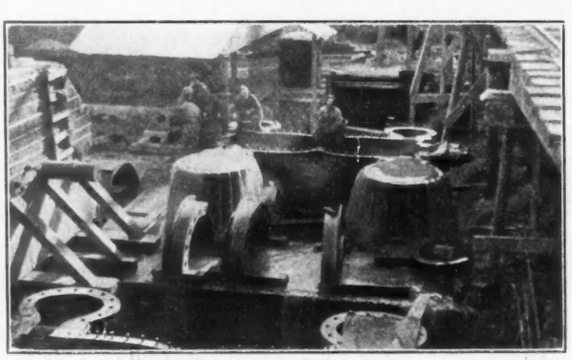


FIG. 4—ASSEMBLY OF FIRST 1000-HP TURBINE INTERFERED WITH BY FLOOD

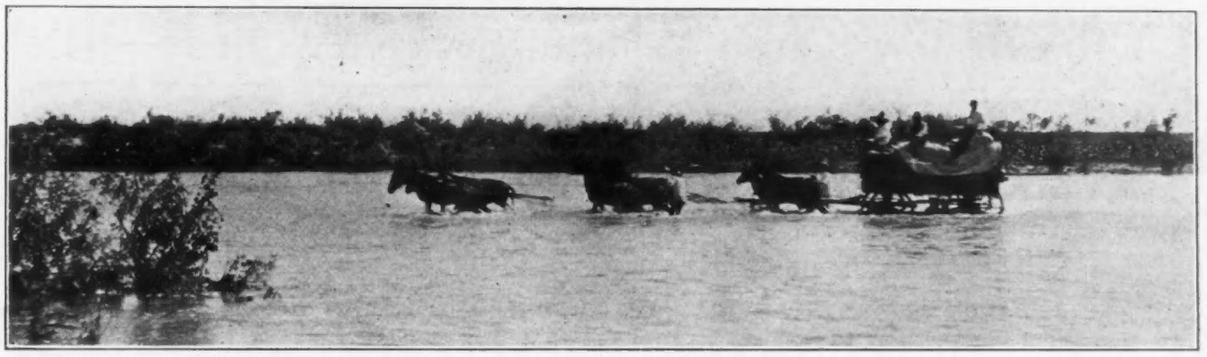


FIG. 5—GETTING OUT OF MEXICO—CROSSING THE RIVER FLORIDA, NEAR SANTA ROSALIA

culprits, the general ordered out a firing squad and dealt with the guilty parties in Mexican fashion.

The railroads north and south being destroyed, it was necessary for the Americans to travel about 300 miles overland from Santa Rosalia northeastward via Ojinaga and Presidio to Marfa, Tex., the latter place being the nearest railway station. The trip was made by wagons equipped with provisions and water and occupied a week. The members of the party were awakened from peaceful slumbers in camp by the roadside about 3 o'clock one morning, to be confronted by a party of rebels. They inquired where the Americans were from, where they were going, examined their passports, partook of breakfast with them, bade them "adios," and left them to proceed happily on their way to the border. The party finally arrived at Marfa looking like tramps and feeling very doubtful whether they would be received at the hotel.

Were one to take a trip over the Mexican Central Railway southward from El Paso, Tex., at present, he would pass mile after mile of wreckage—steel rails bent and twisted like pine shavings, telegraph lines down, the remains of burned railway passenger coaches and freight cars, and railway stations gutted by fire. Occasionally one will see numerous mounds of earth and stone hastily gathered over the remains of those fallen in conflict, bleached bones of men and horses, the figure of a man strung up on a telegraph pole—all speaking silently but with sad impressiveness of the terrible conflict being waged in Mexico.

As soon as peace and order have been restored it is expected that work will be resumed upon the project of the Mexican Northern Power Company near Santa Rosalia, and some of the American engineers expect to return to their work. Those who shared the 300-mile overland journey across the border were Messrs. R. H. Dillon, S. P. Weinberg, A. Garnerdinger, S. Newkirk, G. French, R. Allen and the writer.

Auxiliary Steam Plant for Sanitary District

As the result of an exhaustive study by Mr. E. B. Ellicott, electrical engineer for the Sanitary District of Chicago, the latter's board of trustees has contracted for the purchase of an auxiliary steam plant. As is well known, the Sanitary District operates a hydroelectric plant on the Chicago Drainage Canal at Lockport, Ill., transmitting the energy about thirty miles to a terminal station in Chicago at Western Avenue and West Thirty-first Street. The new steam auxiliary is designed to meet the anticipated demands for peak-load conditions. It will be installed in the Thirty-ninth Street pumping station of the Sanitary District (Thirty-ninth Street and Lake Michigan), and will consist, essentially, of a 4000-kw horizontal General Electric turbo-generator. The turbine is to be operated by steam taken from the bank of boilers now in place in the pumping station. The cost of this auxiliary will be about $80,000. Acting on the advice of the electrical engineer, the trustees have also contracted to purchase a synchronous-condenser equipment to be installed in a suitable building to be erected at the Western Avenue terminal station. This equipment will consist of two 2000-kw, 12,000-volt, 600-r. p. m. synchronous condensers built by the General Electric Company. These machines will cost about $60,000 and are intended to improve the operating and power-factor conditions of the hydroelectric system of the District.

Additions to St. Louis Company's Motor Load

With the completion of the new factory of the St. Louis Screw Company, St. Louis, Mo., approximately 1800 hp in connected motor load was added to the lines of the Union Electric Light & Power Company. Making steel for its nut and bolt factory, this industrial plant averages a demand of about 1000 kw, and it is thought that within the next year this demand will be increased to about 1200 kw, the connected motor load increasing to about 2500 hp.

Another isolated plant in the heart of the St. Louis business district was recently shut down when the Security Building began receiving electric service from the central-station company. The combined demand of this building will probably be 130 kw. Its old steam-electric plant will be retained by the Union Electric Light & Power Company for steam-heating purposes during the winter months. According to Mr. F. D. Beardslee, sales manager for the Union Electric company, the owners of isolated plants in downtown St. Louis are, one by one, finding it to their advantage to adopt central-station energy, and a cleaner city is resulting.

Electric Heater to Augment Oil-Well Flow

In the oil fields of the Whittier (Cal.) district, which is served from the lines of the San Joaquin Light & Power Company, experiments are being made with an electric heater which, it is claimed, will increase the output of flowing oil wells. The heater is a long cylinder of brass containing numerous coils. The cylinder is lowered to the bottom of the oil well and the resulting increase in flow is explained on the theory that the heat expands the gas, causing a greater upward pressure. The hourly consumption of the heater used at present is about 9 kw-hr. If the heater is a success, it will be a great income producer for the electric company and also for the oil companies which will use it.

The Boston Edison General-Service Buildings—III

Standardizing and testing laboratory equipment—Apparatus for high-tension tests and large-current measurements—Photometer room and photographic department. By H. S. Knowlton

IN the two preceding sections of the present article a description was given of the general features of the new general-service buildings just completed by the Edison Electric Illuminating Company of Boston at a cost of about $1,000,000. The fireproof structures for storing material, equipment and supplies, the meter shop, the arc and incandescent lamp departments, the electric vehicle garage and the "welfare buildings" of the group were described in detail.

Testing Laboratory

"The laboratory," or Building No. 5, is the home of the department of standardizing and testing and is one of the most complete in the world, having been designed for routine and special work of the greatest variety after conferences with experts from the Bureau of Standards, Washington, D. C., the General Electric Company's laboratory staff, and other institutions. The company is particularly indebted to the Electrical Testing Laboratories, Inc., New York, in this connection. The needs of the department have long been realized by its officials, but until the completion of the present structure the space available for tests and investigations had been extremely limited.

In general design the new laboratory consists of two interconnected buildings, the intermediate portion being constructed in such manner that any possible vibrations from the rear portion may be prevented from reaching the front. The latter section is a two-story building in which the more delicate work is performed, the rear being set apart for heavier testing work and for investigations on a larger scale.

The laboratory organization consists of four divisions —standardizing, station testing, steam testing and clerical—about forty employees being on the roll. The services of the department are rendered at rates which make it self-supporting, all other departments being charged for work done according to a schedule which includes overhead charges and running expenses in full. The routine work includes a large amount of outside testing in generating plants and substations, on the distributing system and elsewhere. The calibration of all

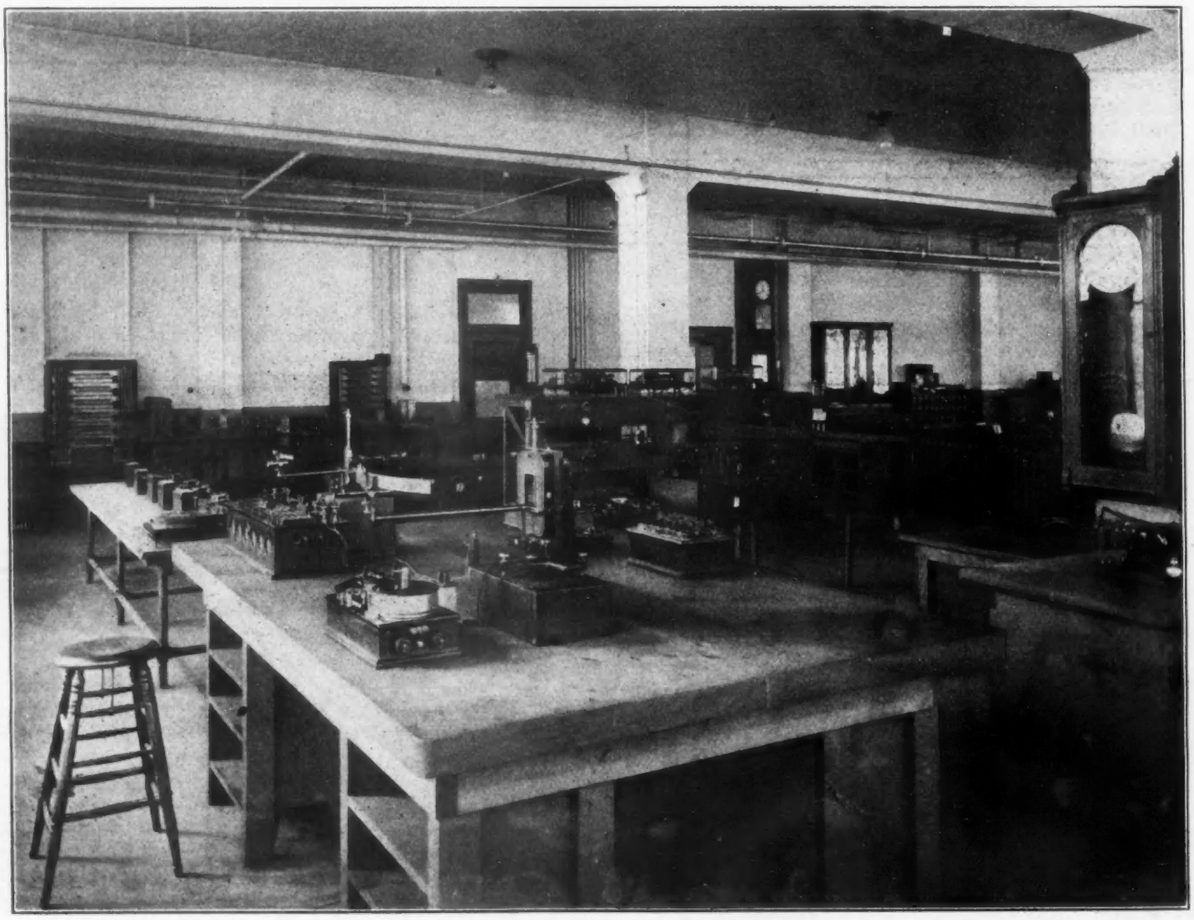


FIG. 38—GENERAL VIEW OF STANDARDIZING LABORATORY, SERVICE BUILDINGS, BOSTON EDISON COMPANY

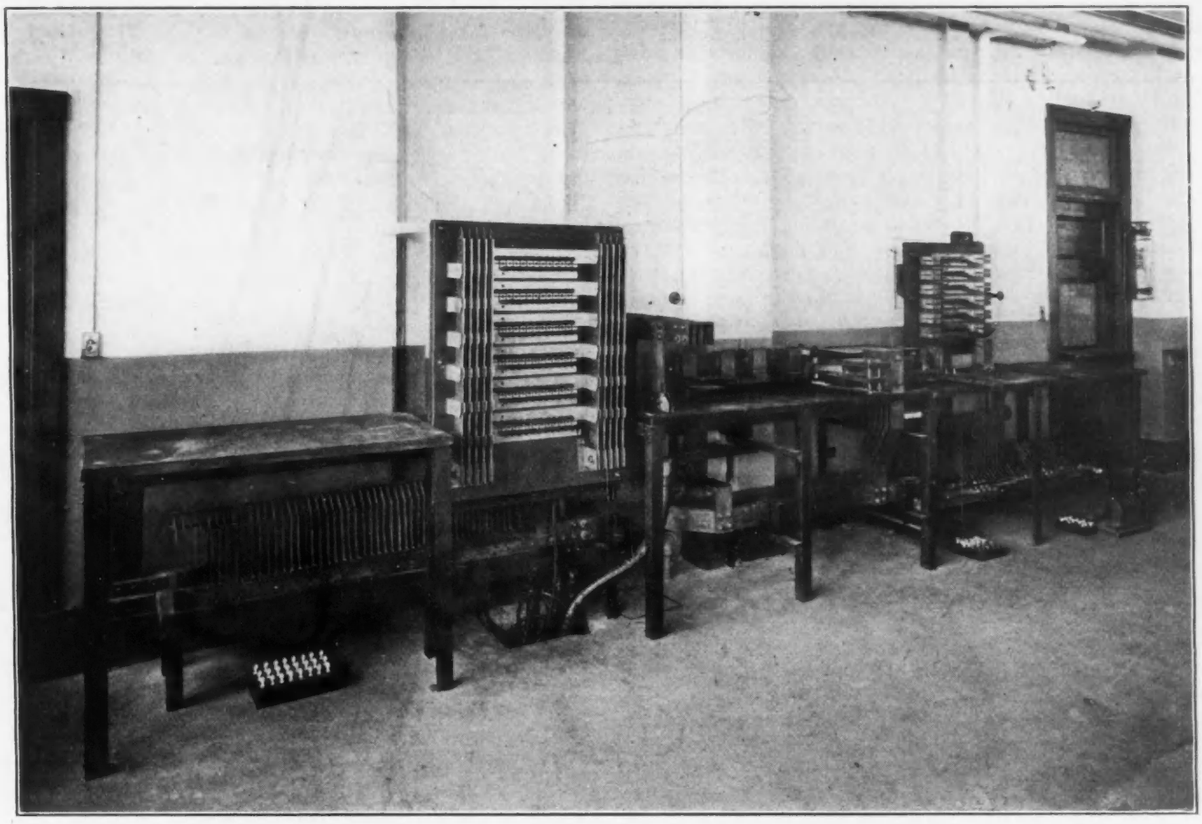


FIG. 39—BATTERY SWITCHBOARD AND BUSES, STANDARDIZING LABORATORY

station instruments and portable standards used by the company, tests of turbines, generators, cables and transformers, a large amount of photometric work, the provision of accurate time service derived from a radio installation receiving daily signals from the government plant at Arlington, Va., the calorimetry of fuel, tests of steam gages, thermometers and indicator maintenance, maintenance of instruments of precision, care and calibration of Sangamo ampere-hour meters used on the company's electric vehicles, high-potential, relay, shunt and other tests are handled by the department, which also does all the photographic work on the system and provides facilities for research by the company's consultants. A branch laboratory is maintained at the L Street station in South Boston, the principal generating plant, where two men are constantly at work in the department's service.

On the first floor of the building, at the front, are the general office and private office of the head of the department, a standardizing room, battery room, meter room and locker room with lavatory and shower bath. The second floor contains quarters for the photographic section and rooms for photometric and spectroscopic work, calorimetry, radio signal apparatus and steam testing.

The electrical center of distribution for the building is at a main switchboard in the larger testing room at the rear, cables of various sizes being run from switches on the panels to the different divisions of the laboratory in Orangeburg fiber conduit. The floors are of reinforced concrete, that in the large testing room being capable of supporting a loaded truck weighing complete 25 tons. A tar and gravel roof provides ample space for investigations out of doors, and an opening has been left for use as a porte lumière in connection with spectroscopic work. Motor-driven ventilating-fan outlets are provided at the roof level, and the photographic studio has a large skylight facing north which is brought up through the roof at one corner of the building.

Standardizing Room

The standardizing room, at the left of the main entrance on the ground floor, is provided with heavy slate tables and wall benches instead of the piers often found in laboratories. These benches are 1.5 in. thick, while the table slabs reach a maximum thickness of 3 in. The wall benches are carried 30 in. above the floor and are 2 ft. wide. Testing stations are in general supplied with energy from cables carried upward from the floor ducts by conduit run through a split handhole cover, the handhole being 1 ft. square at the top and about 2 ft. square at the bottom. Practically all the benches and tables are provided with shelves, and a great variety of delicate testing can be conducted at any time in this space. The benches ordinarily provide for the support of instrument cabinets, standard balances, apparatus for checking voltmeters of alternating-current and direct-current types, calibration of resistors and millivoltmeters, and galvanometer work. The tables are usually devoted to speed checking, the calibration of frequency indicators, thermometer comparisons, calibration of ammeters, shunts, current transformers and other instruments by reference to standards. The installation of the wiring in the floor ducts reduces the field effect on apparatus and gives a larger head room, while the use of brass screws and wholly non-magnetic material in the tables and benches is of obvious advantage.

Among the special features of the room are a 7000-volt non-inductive, zero-temperature coefficient resistance rack mounted just below the ceiling, storage cells arranged on trucks for instrument testing, a motor-generator designed for voltmeter calibration with instruments of varied range, a motor-driven tachometer

and frequency-indicator testing set, Kelvin balances, standard resistances and special cable connections with the high-tension test section of the larger test room. The laboratory is provided with two "chloride accumulator" storage batteries of seventy-two cells each, one having a discharge rate of 40 amp-hr. per cell for one hour and the other a rate of 60 amp-hr. These two batteries are housed in an acid-proof and fume-proof room adjoining the standardizing room, and each cell is connected to copper positive and negative contacts on a switchboard in the standardizing section, the wiring being compensated in size for the distance of each cell from the switchboard. The individual leads vary in size from No. 0 to No. 4-0, to give even discharge to all cells.

Two switchboards are provided, one for each battery, and the two boards are interconnected by heavy copper buses with terminals for the insertion of instrument shunts and with inter-bus resistors which provide a load for testing the latter. Current variation is secured by the use of plugs which cut resistance in and out of circuit with the utmost flexibility. The contacts receiving the positive and negative leads from the different cells are arranged for connection with the buses by the insertion of plugs, and any desired combination of cells in series and multiple can be made, giving a maximum current of 7500 amp with all cells of both batteries in multiple. The battery bus is connected with the large test room in the rear of the building by two 2,000,000-circ. mil cables, and current of the maximum steadiness is thus available for demand-indicator and any other tests requiring it.

The calibration of current transformers is cared for at a special bench in the standardizing room, where a Leeds-Northrup mercury ammeter, an induction regulator and a boosting transformer are installed, with reversing switches throwing the ammeter upon either the direct current or the alternating current. The table carrying the secondary instrument is 15 ft. distant from the transformer under test in order to minimize the field effect. The observer is provided with a hand wheel and a long rod with which to operate the induction regulator. Near this test station is a storage room for laboratory instruments and supplies, all apparatus and material being card-indexed and handled by a stock clerk. In this room are installed a telephone transmitter and telegraph sounder used in furnishing the company's telephone exchange with time signals in the form of second beats from the standard laboratory clock. The transmitter and sounder are mounted in a resonating box and mechanically connected. A useful feature of the instrument stockroom is a 12-in. by 14-in. by 18-in. cabinet containing 100 pigeonholes for the housing of thermometers, the holes being numbered from the top downward according to the increasing temperature scales of the instruments.

Main Switchboard

The main switchboard of the laboratory, in the rear testing room, is 16 ft. long and is composed of six marble panels set about 6 ft. away from the wall, the switching arrangements having been made as simple as was consistent with the service requirements. At the rear of the board and behind a grill running from each end to the wall are sets of busbars which receive the various services from the substation on the property

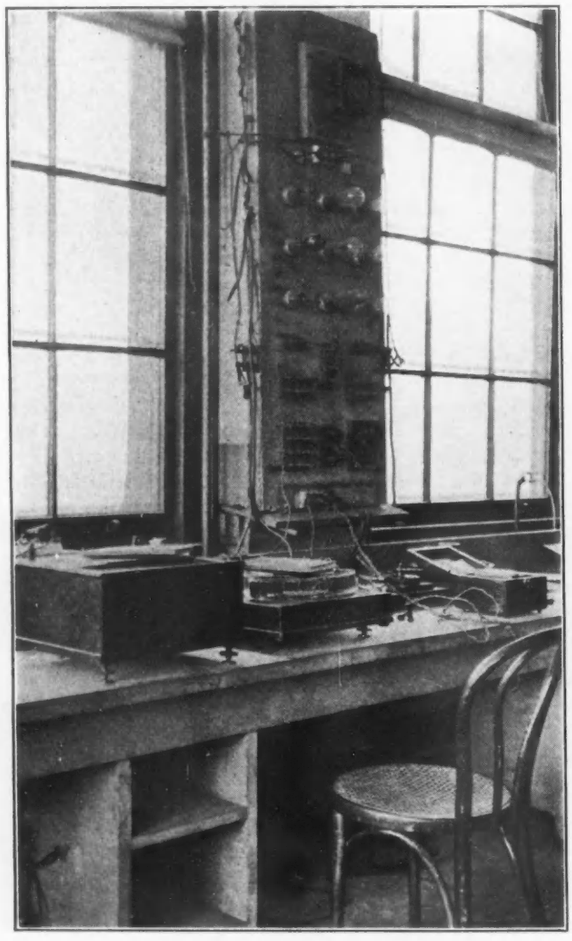


FIG. 40—VOLTMETER TEST STATION

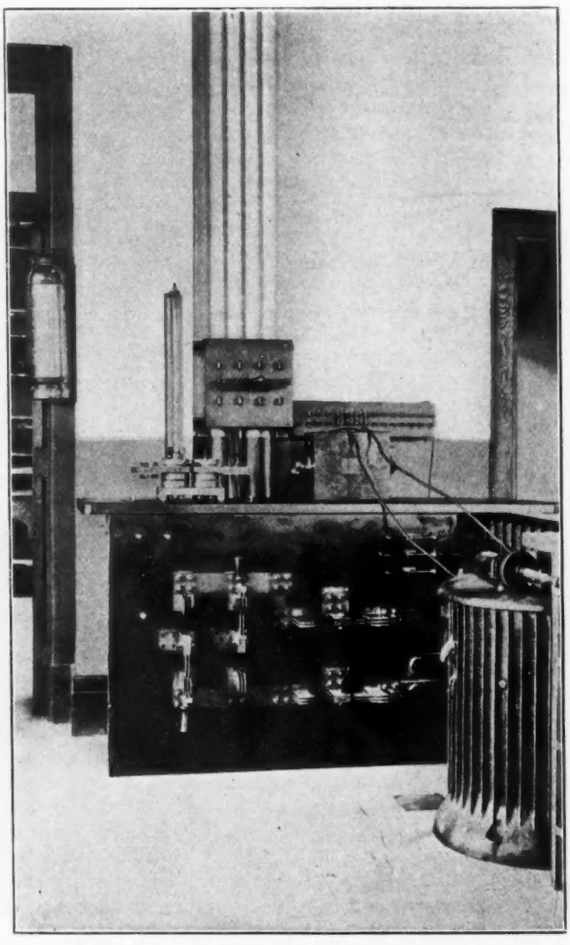


FIG. 41—CURRENT-TRANSFORMER TEST STAND

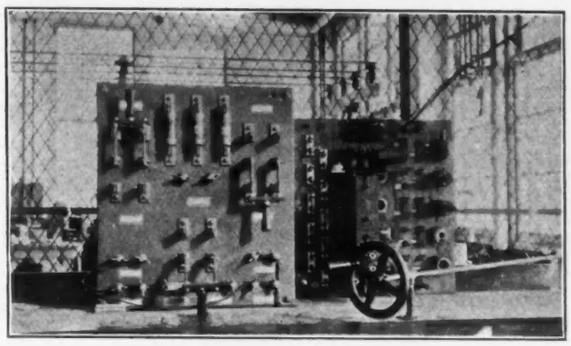


FIG. 42—LOAD BOARD AND SWITCHES FOR LARGE-CURRENT AND INSTRUMENT TESTS

and from which permanent and temporary plug connections are made for local distribution.

The top bus is for three-wire direct-current 110-220 volt service, being connected with the substation by two lines. One line is provided with horizontal taps leading to special plug receptacles on the rear of the board to facilitate transfer of energy in this form to other parts of the laboratory. The second bus installation is for three-wire alternating-current 115-230-volt regulated motor-service; the third handles the ordinary three-wire, 115-230-volt alternating-current motor service of the building, and the bottom bus cares for three-phase, 220-volt service, the central portion being broken to allow the insertion of a transformer in the floor from which three-phase, 110-volt energy may be derived. The 6.6-amp, constant-current arc circuit from the meter shop to the laboratory does not run through the main switchboard but is carried directly to the photometer room in lead-covered cable.

The absence of instruments and other complicating features from the switchboard is indeed striking. Many points in the laboratory are connected by permanent leads with receptacles on two transfer panels at the right-hand end of the board; and by plugs and jumpers the utmost flexibility of interconnection is rendered possible. Service from any bus can be transferred to any local experiment station in a moment, and the interconnection of many of these stations, both in the standardizing room and in the main test room, enables circuits to be looped through the establishment as occasion demands. The absence of exposed wiring is one of the many good features of the building. At the rear of the main switchboard is a lamp bank mounted on the wall, with special connections with the standardizing laboratory, and beyond the board are benches for vacuum cleaner and other special tests. A meter test table with adjustable framing provides special cable connections to the battery buses and also the usual switchboard leads.

High-Tension Testing

Ample space for high-potential testing is provided behind the grill in the main test room. In this section are installed an operating switchboard controlling the supply of energy to step-up transformers, induction regulators, benches for special tests of insulating material, and sections set apart for transformers and cable submergence testing. Two transformers of 15-kw and 50-kw rating, when connected in series on their secondary sides, provide energy for testing at 90,000 volts, and a number of smaller transformers are available for lower voltage testing. At present the highest pressure employed on the Boston Edison system is 13,800 volts.

To provide ample clearance in testing at the higher voltages, four buses composed of discarded brass condenser tubes have been mounted on insulators carried on treated wooden cross-arms at a height of 9 ft. above the floor. Connections to spark-gaps and other apparatus are then made by short open runs of loose wire. The smaller testing transformers are mounted on trucks and terminals are provided in this section connecting with the standardizing room by cables insulated for 15,000-volt service. For testing reels of cable or shorter lengths of conductor under water a concrete pit 7 ft. deep is provided, with water piping for rapid and slow filling. Doors with Yale locks are provided in the high-tension test section. One of these, which is large enough to permit the entrance of heavy material, can be opened from the inside only.

Outside the high-tension test section is a space devoted to tests of apparatus requiring high current values. Heavy cables from the switchboard are run to this section via a general test table in the center of the room, and excellent facilities are available for commercial tests. A special switchboard in this section provides a group of circuits common to various switchboard instruments, the electrical features of these being mounted on the panel and arranged for connection as required in the circuits of other apparatus under test, so that full service conditions may be reproduced. Current values as high as 3000 amp and at pressures as low as 10 volts are available in this section of the laboratory, and three Siemens-Halske standard current transformers are installed for test purposes. An induction regulator is also a part of the equipment. A valuable piece of apparatus stored in the high-tension section is an oscillograph, complete in its mounting and ready for immediate shipment. This apparatus can be set up for service in thirty minutes.

The main testing room is also provided with storage racks and bins for loose wire of all sizes, lugs, station instrument parts and miscellaneous material. A shipping and receiving room, 16 ft. square, occupies one corner, and in another are an instrument repair shop equipped with a watchmaker's bench, a Hjorth lathe individually driven by a ¾-hp motor, a vertical drill directly driven by a 1-hp motor, stock cabinet for instrument parts, a sink and a testing bench. A three-phase load board with a rating of 500 watts is in service, and the shop is provided with outlets for alternating-current and direct-current service of various types and a millivoltmeter adjustable resistor for testing. A transformer for reducing the voltage in heavy current work is also located in the shop. The general test room is lighted at night by thirty 150-watt tungsten lamps in prismatic reflectors, the lamps being installed 21 ft.

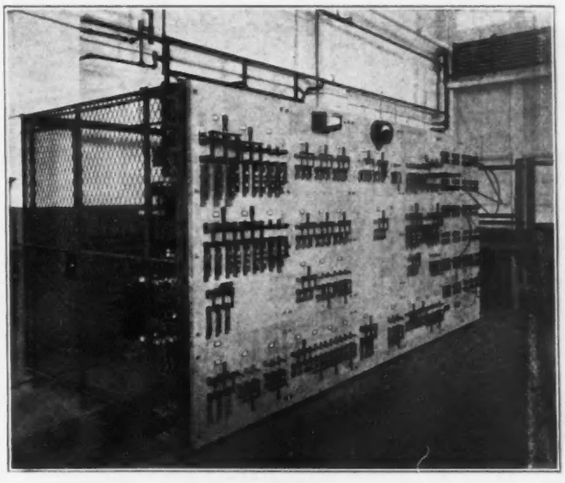


FIG. 43—MAIN SWITCHBOARD SERVING THE TESTING LABORATORY

above the floor. For testing purposes a special ground wire is run throughout the building and is connected with a coke and plate ground outside in the yard.

Photographic Section

The photographic section is provided with a general studio and with printing and dark rooms. Its equipment includes metal cabinets for the storage of prints and recently developed negatives and for supplies and apparatus. A photostat is in service, and ample provision for making enlargements has been afforded. Much of the work can be done by daylight, but when darkness is required double sliding curtains shut out all the light. An interior dark room reached by a winding corridor is utilized for most of the plate developing. Developing lanterns are in general equipped with an 8-cp copper-flashed lamp in each instance, and the dark rooms are ventilated by motor-driven fans. Excellent facilities are at hand for the making of lantern slides used in the company's lecture service. Among the conveniences of the section are a foot switch controlling incandescent lamps used in printing, so that the operator can give his entire attention to shading, a flexible copy board, a print-drying rack, and special facilities for drainage at sinks. Enlargements and reductions are made by the light of a 30-amp, 110-volt arc lamp placed behind a condensing lens 14 in. in diameter and equipped with ground glass diffusers mounted on a partition between the studio and the printing room.

Photometer Room

The photometer room is divisible into three experimental areas separated by dark curtains and is provided with various electrical service outlets and with permanent connections running to the main switchboard on the floor below. A distributing switchboard in one corner controls the supply of energy to the terminals in different parts of the room, and transfer lines are provided as in the main test room. In general, all alternating-current lines are installed at the left side of terminal boards and direct-current lines at the right. Two lines connect the battery room and photometer room. The equipment of the latter includes a bar photometer, a spectrograph, a porte lumière, four stations for series arc-lamp current supply, storage cabinets, and a 2-m. Ulbricht sphere photometer. Racks for life tests of lamps are installed, and a section of the room is devoted to swinging mirrors for arc-lamp photometry. The curtains enable different researches and tests to be carried on simultaneously without interference, and when larger areas are required the absence of rigid partitions is of great value.

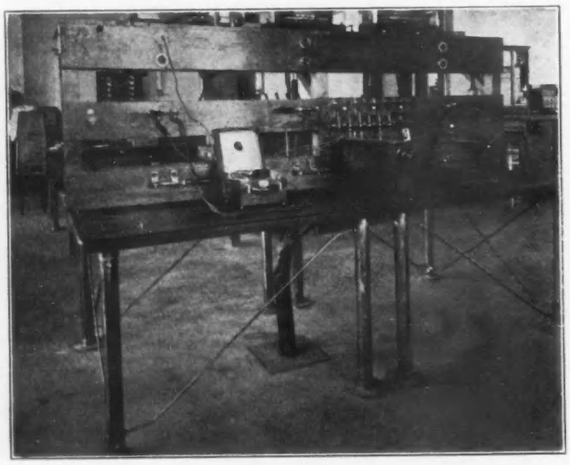


FIG. 44—TEST TABLE, SHOWING KELVIN BALANCES AND METHOD OF WIRING FROM FLOOR HAND-HOLE

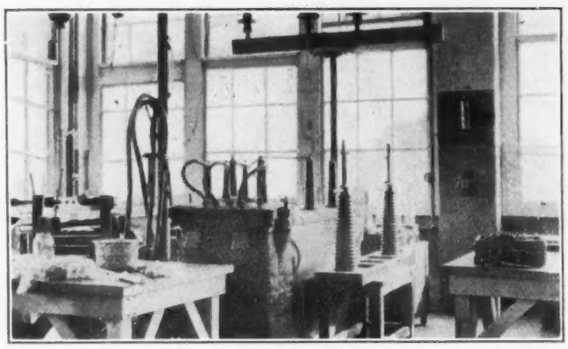


FIG. 45—HIGH-TENSION SECTION OF CHEMICAL LABORATORY

Chemical Laboratory

The chemical room is equipped with four hoods ventilated by a motor-driven fan, test tables, sinks and the usual adjuncts of an analytical laboratory. The outlet duct in one hood is carried close to the working plane to provide for the withdrawal of heavy gases. Electric hot-plates and a Freas constant-temperature 600-watt electric oven are included in the equipment. An electrically heated water still will probably be installed later. Space does not permit further description of the chemical equipment, but the fuel calorimeters are provided with motor-driven stirrers having an emergency connection to the laboratory storage-battery room in addition to the usual direct-current supply from the service mains in the building. A 12-volt battery circuit is used in igniting the charge in each bomb. A 1-hp motor driving a coal grinder, pulverizer and mixer and a motor-driven ventilating fan for the preparation room are other electrical features.

Rooms are also provided for general test and reclamation work, notably the salvage of platinum obtained from the leading-in wires of series incandescent street lamps. The entire laboratory is well equipped with telephone service, some eighteen stations being at present in use and operated from a supervisor's board in the general office. The wireless aerial has an effective length of 175 ft. It consists of four strands of bronze wire spaced 4 ft. apart, running north and south between the laboratory and the top of the garage building.

Daylight Signaling with Illuminated Targets

With the recent developments in lenses for signal purposes, according to Mr. Thomas S. Stevens, signal engineer for the Atchison, Topeka & Santa Fé Railroad, it is now practicable to illuminate signal targets sufficiently for the different colors to be readily distinguished in daylight at a distance of 2000 ft. (609.6 m). Of course, this method is possible only where electric light can be used, but it provides a very cheap and efficient way to signal electric roads where plenty of energy is available at a low cost. All the complicated mechanisms necessary for the mechanical operation of signal arms are eliminated and replaced by simple electrical circuits which are far more efficient and economical to maintain. In the majority of cases two 25-watt lamps are used behind an 8-in. lens. Indeed, it appears that the problem with this type of signaling is to provide a light signal sufficiently visible in bright sunlight which will not make the signal too prominent at night.

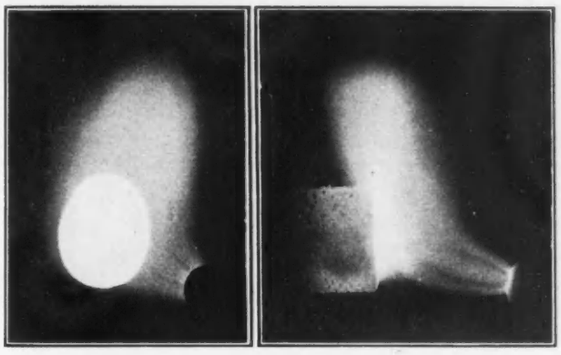
Search Lamp with Vapor-Cooled Electrodes

Constructional features and performance characteristics of an arc lamp operating at greatly increased current density

A TYPE of search-lantern being tested by the United States Navy possesses many interesting constructional features and operating characteristics. As compared with the earlier types of search-lanterns it has much smaller electrodes, operates at a much higher current density and temperature, and produces a greatly increased candle-power for the same energy.

The chief feature of the lamp is the smallness of the diameter of the electrodes. As compared with the earlier electrodes for say 150 amperes of 38-mm diameter, the new electrodes have a diameter of 16 mm, the cross-sectional area being only about one-sixth as large. The current density is therefore six times as great as that used with the earlier lamps.

A limitation to the increase in current density in the earlier lamps was found in the fact that when the specific brilliancy of the crater reaches a certain value, depending upon the volatilization point of the electrode material, an increase in the current strength is accompanied by an increase in the area of the crater without change in the specific brilliancy. This limitation has been overcome in the new lamp by forcing alcohol vapor around the electrode to act as a cooling medium and to protect the electrode from combustion. This arrangement gives rise to a very striking phenomenon. The constant cooling of the electrode mantle causes the current to emanate from only the limited front-tip of the electrode. This phenomenon is connected with an increase in the pressure which causes considerable quantities of energy to be converted at the anode-crater. The crater area hollows out the tip of the electrode like a funnel and the hollow is completely filled up by the fumes of the core material. The crater is filled up with the illuminating fumes, the light effect of which is further increased by the white-hot carbon. The crater appears like a sharply defined point of light of extremely high specific intensity.



FIGS. 2 AND 3—FULL-SIZED VIEWS OF ELECTRODES

The illuminating part of the arc lies almost in the hollowed out positive electrode. The positive electrode

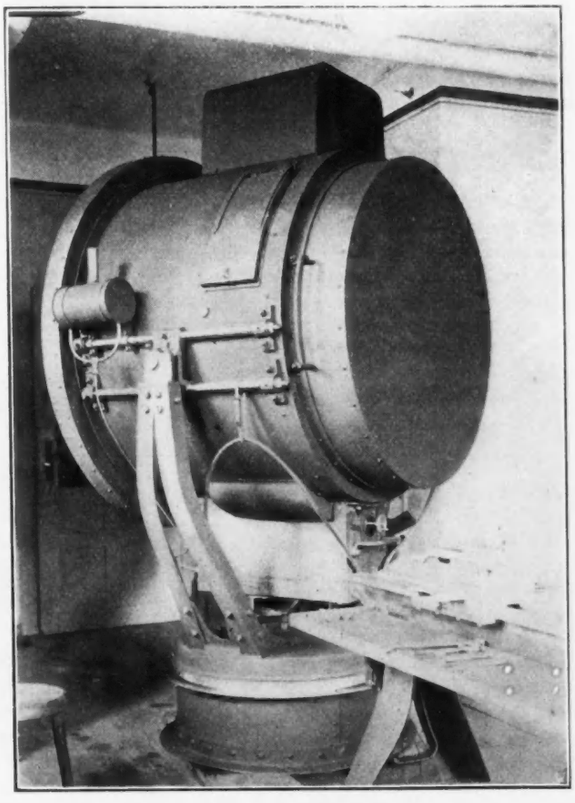


FIG. 1—EXTERIOR VIEW OF LANTERN

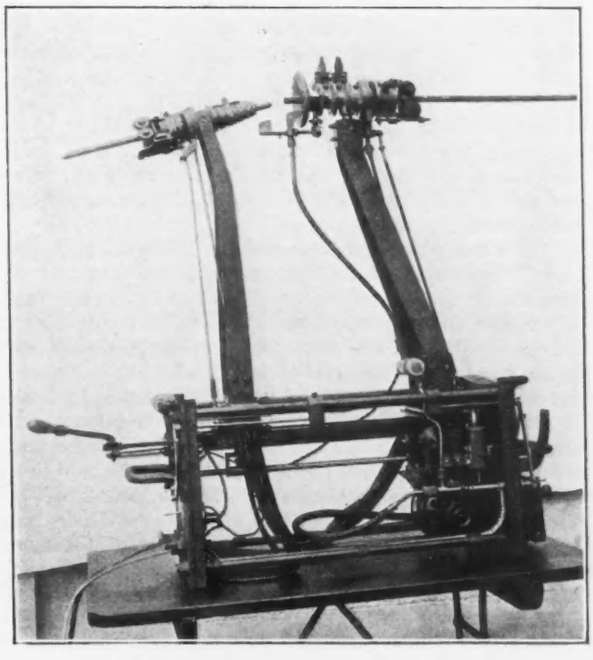


FIG. 4—ARRANGEMENT OF LAMP ELECTRODES

is not reduced to a point, as was formerly the case, but maintains its full diameter up to the crater. The negative electrode is also operated at an exceptionally high current density, the diameter for 150 amp being only 11 mm. It has proved advantageous to rotate both the positive and the negative electrode, in order to maintain a perfectly uniform bathing with gas and to insure equal or straight combustion.

The new lamp is illustrated in Fig. 4. The electrodes are not clamped in a holder, as it has been the custom formerly, but are led through special electrode-heads which act as conductors for the current. The positive electrode is placed in a horizontal position while the negative one is placed at a certain angle therewith.

During operation both electrodes are rotated uniformly by means of a clamping device which is driven from beneath by a motor. Alcohol-vapor has been found to be the most suitable as the cooling medium. It is generated in a very simple manner in a vaporizer from ordinary methylated spirit. The vaporizer is composed of a cylindrical chamber filled with wire gauze and heated by a small electric resistor. The

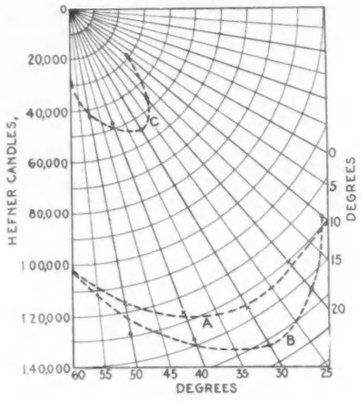


FIG. 5—POLAR CANDLE-POWER CURVES

spirit, supplied from a vessel outside the search-lantern, is admitted at a uniform rate into the vaporizer where it is volatilized immediately on the heated metal parts and escapes in the form of a gas through the nozzles. It is ignited at the hot electrodes but produced the desired cooling effect since the temperature of the alcohol is far below that of the electrode points. The feeding of the alcohol takes place automatically when the arc is struck, a valve governed electromagnetically being used for this purpose.

Fig. 1 shows a search-lantern in the course of erection. The supply tank for the methylated spirit can be seen at the side. It is well known that the crater of the arc in a search-lamp ought to stand exactly in the focus of the mirror reflector. It is stated that trials have established the fact that by means of a hand lever the crater can be kept fixed at within 1 mm. of its exact position. The operator of the search-lantern needs to pay attention only to the correct adjustment of the advance of the negative electrode and when necessary make slight corrections by means of the lever.

Despite the exceedingly small diameter of the negative carbon, the protecting gas has such a favorable effect on the combustion that the rate can be reduced to 35 mm per hour. For practical work a combustion of from 50 mm to 60 mm per hour has proved very advantageous. With the positive electrode various conditions make a limited combustion appear less advantageous and a combustion of from 200 to 250 mm per hour is allowed. A new positive electrode can be inserted into a hot search-lantern in a few seconds. With the search-lamps hitherto used a quiet initial burning of the electrodes, especially at high intensities of current, was hardly possible, whereas the new search-lamp is ready for work in a few seconds.

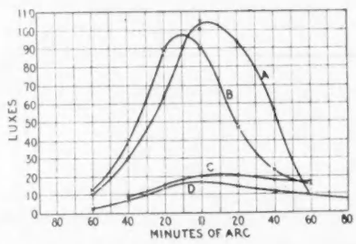


FIG. 6—ILLUMINATION PRODUCED AT 6800 FT.

A comparison of the performance of the new type of lamp with that of the older types is given by the polar-candle-power curves of Fig. 5. The values are expressed in hefner candles, one hefner being equal to 0.9 International candle. Curves *A* and *B* relate to the apparent candle-power of a lamp with alcohol-cooled electrodes, while curve *C* shows the apparent candle-power of a lamp with ordinary carbon electrodes operated under identical conditions as to current consumption and reflector equipment.

In Fig. 6 are shown the illuminations produced at a distance of 2075 m (6800 ft.) by the two types of lamps. Curves *A* and *B* refer to the new lamp and curves *C* and *D* to the old. The illumination is expressed in luxes, one lux being one lumen per square centimeter and hence equal to 929 lumens per square feet or 929 foot-candles. Curves *A* and *C* were taken in one plane and *B* and *D* in another at right angles thereto.

Illumination measurements similar to those shown in Fig. 6, but made at a distance of 8400 m (27,550 ft.), are reproduced in Fig. 7.

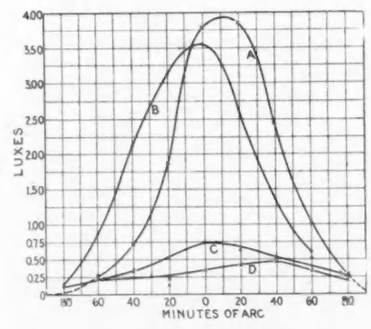


FIG. 7—ILLUMINATION PRODUCED AT 27,550 FT.

From Figs. 6 and 7 it will be noted that the spread of the beam is somewhat greater with the older than with the newer type of lamp, but the effective strength of the beam of the new lamp is about six times as great as that of the older lamp.

The new lamp with alcohol-cooled electrodes is the invention of Mr. Heinrich Beck, Meiningen, Germany, to whom patents covering it have been issued in Germany, Austria, Switzerland, Italy, United States, Canada, England, France, Belgium and Turkey. The United States patent was granted on June 18, 1912. The interests of Mr. Beck in the United States are being looked after by Mr. Louis J. Auerbacher, New York City.

Central Station Management

Devoted to Discussion of Administrative Policies, Commercial Methods, and Current Practice Among Successful Utilities

Some Personal Testimony for Central-Station Service

About two years ago the Dean Forging Company, Muncie, Ind., was operating an isolated power plant consisting of two 300-hp boilers supplying steam for a 100-kw, 220-volt, three-phase, sixty-cycle turbo-generator set, a steam engine capable of delivering about 150 hp, and a number of steam hammers. The turbine furnished energy for several motors in the machine shop, and the reciprocating engine, connected by a rope drive to line shafting, drove two blowers, two hammers and a small oil pump. Tests showed that the average load on the turbine was only about 18 kw, while indicator cards for the engine showed it to be developing about 82 hp.

TABLE I—MOTOR APPLICATIONS

Hp Rating	Speed, R.p.m.	Drive	Machine
7.5	1200	Geared	Shaper.
35	900	Belted	Line shaft, 14-in. tool lathe, 24-in. engine lathe, No. 4-B. B. & S. milling machine, No. 2 P. & W. die sinker, No. 3 P. & W. die sinker, 27-in. to 56-in. Putnam gap lathe, 20-in. shaper, 24-in. shaper, two 24-in. by 24-in. planers, 28-in. drill press, 20-in. drill press, cold cut-off machine, saw-grinding machine, Universal cutting grinder, No. 35 Connersville rotary blower.
3	1900	Belted	3-in. by 3.5-in. vacuum pump.
15	1200	Belted	Two cold trimming presses.
10	900	Belted	Bliss 112-ton trimming press.
10	900	Belted	Bliss 112-ton trimming press.
10	900	Belted	Bliss 112-ton trimming press.
15	900	Belted	156-ton trimming press.
15	1200	Belted	Bliss 187-ton trimming press.
25	1200	Belted	3.5-in. National forging machine.
50	900	Belted	Two board drop hammers, small oil pump, pair snagging wheels, No. 5-B Wilbraham-Green positive pressure blower.
35	720	Belted	No. 6-B Wilbraham-Green positive pressure blower.
7.5	1200	Geared	180-ton trimming press.
7.5	720	Geared	150-ton trimming press.
7.5	720	Geared	150-ton trimming press.
25	1200	Belted	5-in. square Pels billet shear.
5	900	Belted	65-ton trimming press.
5	900	Belted	65-ton trimming press
288			

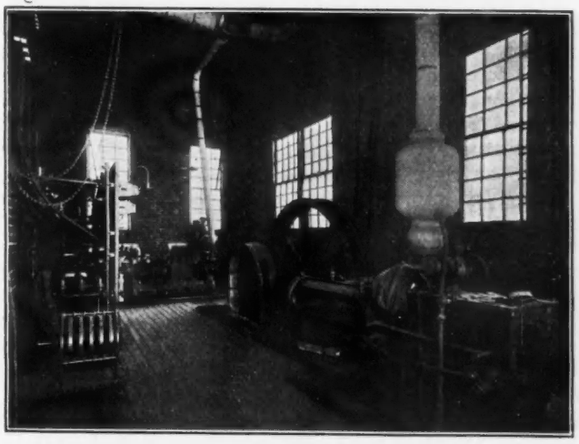


FIG. 1—THE REPLACED ENGINE AND TURBO-GENERATOR

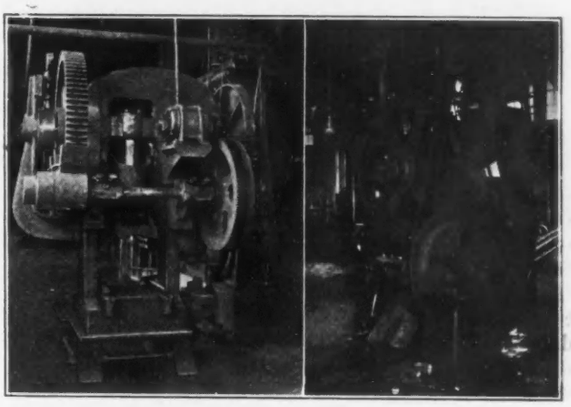


FIG. 2 — 7.5-HP MOTOR GEARED TO 180-TON TRIMMING PRESS

FIG. 3 — 25-HP MOTOR BELTED TO BILLET SHEAR

When the subject of central-station service was broached to Mr. W. H. Carpenter, manager, and Mr. J. B. Brazier, superintendent of the Dean company, they were quick to realize its advantages and signed a contract which released them from the responsibility of trying to maintain a rope-drive installation. Both the turbine and the engine were taken out of service and the steam from the boilers was used to drive the company's twelve steam drop-hammers, which range in size from 200 lb. to 7000 lb. Of the eighteen 220-volt, three-phase motors now installed fourteen are of the squirrel-cage type and four are equipped with internal resistance. The aggregate rating of these motors is 288 hp. However, three motors totaling 22.5 hp have just been installed, and although listed in the accompanying table they were not used in obtaining the estimated load-factor given below. Assuming an efficiency of 80 per cent for the motors the operating load-factor of this forge shop—that is, the percentage of average load for ten hours a day to the rated capacity of the motors—is 37.2 per cent. The company makes automobile forgings of all kinds, its specialty being alloyed steels, and with a force of forty or fifty men employed the average output of the forge shop is about 175 tons of steel a month.

TABLE II—KILOWATT-HOUR CONSUMPTION FOR THE LAST TWELVE MONTHS

Date	Kilowatt-hours	Date	Kilowatt-hours
October, 1912.	25,291	April, 1913.	26,708
November, 1912.	25,312	May, 1913.	25,025
December, 1912.	22,083	June, 1913.	21,209
January, 1913.	27,163	July, 1913.	22,718
February, 1913.	24,737	August, 1913.	22,057
March, 1913.	25,553	September, 1913.	17,543

Commenting upon the success of central-station service in the forge-shop work, Mr. Brazier recently said: "I have gained about 30 lb. since central-station serv-

ice was put in. Anyone who could have seen me going home at 2 a. m. or 3 a. m. after working nearly all night splicing rope, as was frequently the case. would have understood one of the reasons why I gained in weight and why I favor central-station motor drive." Energy for operating the Dean Forging Company's machines is supplied from the mains of the Muncie Electric Light Company.

Table I gives a complete list of motors and the machines to which they are connected, and Table II gives the kilowatt-hour consumption by months for the past year, showing an average of 23,949 kw-hr.

The Sales Value of Trial Motor Installations

BY ROBERT C. LEONARD

It is the writer's earnest belief that the average central station fails to secure many possible motor-service customers because it has not sufficient faith in the value of its own proposition. By this is meant that, although the central station's own sales engineers may have made thorough investigations and tests of the prospective customer's plant and determined that central-station drive would effect a very marked saving, the manager of the central station too often refuses to invest the company's money to demonstrate by actual operation that the estimates of his engineers are correct.

The owner of a manufacturing establishment naturally looks with suspicion upon any proposition that means additional investment for him, and he, of course, hesitates to act on the advice of an engineer who is trying to sell him something. If the central station really knows that the many talking points for motors have a genuine money value to the prospective user, why should time be wasted in persuading the latter to spend money on what is to him a doubtful proposition?

For some time it has been the policy of the Nashville (Tenn.) Railway & Light Company, upon the recommendation of its sales engineers, to offer free trial installations to prospective customers. A proposal is made to equip fully the "prospect's" plant for electric drive without calling on the customer for the expenditure of a single cent, although he agrees to pay for all energy consumed during the trial period, which varies in different instances from two to twelve months. The agreement reads that if the customer "is not pleased with the economy and efficiency of electric drive" at the end of the trial period, the company will remove its motors and wiring without expense to the customer. If, however, he desires to continue to operate his plant by electric power, he will pay the company the amount for the motors and wiring previously set forth in the agreement.

The experience of the Nashville Railway & Light Company with this form of offer has been most gratifying. Out of probably a hundred such installations, the only instance in which there was a signal failure was the case of a motor-generator set in a large laundry. Even this equipment was operated at a loss to the laundry man for some months before he would give it up. Although Nashville is far from being a manufacturing center, being primarily an educational town, and although the manufacturing establishments are for a large part wood-working plants with large amounts of offal, the local central station has built up a motor load equaled in few manufacturing towns, its annual load-factor being more than 50 per cent, based on the average monthly peaks and more than 42 per cent based on the maximum yearly peak.

The contention is sometimes made that there is too much of the "personal equation" entering into a transaction like that above outlined; that it is too indefinite and dependent upon the personal whim of the customer. But often this very "personal equation" is the winner for central-station service. In many instances motors have been kept and paid for where the cost of operating them was more than that of operation under the old system. They ran so smoothly and quietly and with so little attention that the plant operator did not have the heart to go back to the old system with its worries.

Why, then, should not the central station show its prospective customers that it believes in its own proposition? This liberal policy has done much with us in Nashville to maintain the confidence of the public and has put much good business on the lines. We do not advocate that such a policy be used indiscriminately, but every central station has available business that can be safely secured in this way.

Growth of the Electrical Appliance Business in St. Louis

For the twelve months ended May 1, 1914, the electrical-appliance department of the Union Electric Light & Power Company, St. Louis, Mo., showed an increase in net returns of over 300 per cent as compared with the preceding twelve months. In discussing this record Mr. C. E. Michel, manager of the company's electric store, recently said: "The chief factor contributing

APPLIANCE SALESROOM OF UNION ELECTRIC COMPANY, ST. LOUIS

to the growth of our appliance sales is to be found in the manner in which this company has gained the confidence of the appliance-buying public by establishing records for prompt deliveries, immediate and properly made repairs of appliances, and liberal interpretations of all guarantees.

"To make the company's electric store as attractive as any business house in the city, it has been equipped with beautifully appointed showcases and wallcases, attractive and unusual show windows, and specially constructed tables enabling the goods to be displayed to the best advantage. Principles of merchandising which have been recognized as successful in other businesses have been employed and well-known commercial systems applied wherever practicable. During the time in which this remarkable record was established the company has held but very few special sales. The policy has been to maintain fair and regular selling prices. In the meantime, of course, advertising has been carried out consistently.

"Among the devices showing heavy increases in sales during the past year, chafing dishes, suction cleaners and fans stood high. There was a really remarkable increase in the sale of both irons and luminous radiators. The sale of small toasters fell off somewhat, but

this deficiency was easily made up for by the increased demand for the heavier electric grills which may also be used as stoves. The increase in vibrators and water heaters was large, but, taken on the basis of percentage, warming pads outstripped every other electrically heated device. There was somewhat of a slump in the sale of curling irons. Of the commercial devices, the tailor's iron leads in the percentage columns, with the electrically heated glue pot a close second."

Electric Show in Small City

At Alliance, Ohio, a city of 17,000 population, an electric show was held recently having a registered attendance of about 20,000. Household appliances and commercial illumination were featured. The commercial display consisted of electrically lighted booths showing the results obtained with different types of reflectors. A model show window was also exhibited to demonstrate the value of properly selected and arranged reflectors. Many appliances were sold during the show, but the principal effect resulting therefrom is declared to be the surprising manner in which merchants who visited the show have awakened to the advantages of well-lighted stores and show windows,

VIEW AT ALLIANCE ELECTRIC SHOW

as evinced by their recent requests for further information. The show was conducted under the auspices of the Alliance Gas & Power Company.

Irrigation Makes Double Crop Possible

Investigations which have been conducted at University Farm, Davis, Cal., show that two crops such as corn ensilage and grain can be grown successfully in rotation on the same ground in the same season if the earth is sufficiently irrigated.

In 1912 and 1913 as soon as the grain was harvested the ground was thoroughly irrigated, plowed, rolled and harrowed. Corn was then drilled in rows 10 in. apart. Plots receiving 5.6 in. of water produced 8 tons of green ensilage per acre; others receiving 10.14 in. in two irrigations yielded 10.6 tons per acre; while a third plot, in which corn was drilled 20 in. apart and upon which 15.5 in. of water was applied in two irrigations, produced 15.4 tons.

The water supplied to these tracts cost $1.73 per acre ft. Where the heaviest irrigation was employed the total cost of production was $16.03 per acre, and as the value of the ensilage cut was $31.80 per acre, there was a net profit of $15.77 per acre.

Enlivening an Outlying Business Center

The accompanying half-tone shows a section of one of the business streets of Kokomo, Ind., which a few weeks before the photograph was taken was dark and almost devoid of traffic after sunset. Seeing that evening shoppers avoided that section of the city because of its unwelcome night appearance, the neighboring merchants co-operated to provide for cheery and attractive street illumination. With the assistance of the Indiana Railway & Light Company, the local electric-service company, this section was shortly transformed by the installation of lamp-pedestals, border lamps, and signs, into a shopping district as well lighted as any in the heart of the city.

ILLUMINATED STREET IN KOKOMO, IND.

Analysis of Meter Reader's Movements

Data published herewith disclose some interesting facts regarding the movements of a meter reader covering seven distinct territories in three and one-half days. While this information applies to Dunkirk, N. Y., a city of a little over 17,000 people, the figures are indicative of conditions existing in all moderate-sized cities. The data show that in reading 730 meters twenty-eight hours was consumed. During that time 681 stairs had to be climbed and 1867 doors had to be opened. In traveling from one customer's house to the next the meter reader traversed 304 blocks and crossed streets 314 times. These figures suggest that considerable time could be saved the meter readers, if the instruments were installed in more accessible places, such as, for instance, on back porches.

ANALYSIS OF INSPECTOR'S MOVEMENTS WHILE READING 730 METERS

Days	Hours Engaged	Route	Meters Read	Stairs Climbed	Veranda Stairs Climbed	Doors Opened	Blocks Walked	Number Streets Crossed	Poles Climbed
1	4	1	175	60	20	376	40	25	1
..	4	2	130	68	47	314	55	44	0
1	4	3	100	69	63	321	56	42	0
..	4	4	92	59	50	271	44	42	0
1	4	5	121	109	65	376	36	88	1
..	4	6	100	37	30	162	52	56	3
½	4	7	12	4	6	47	21	17	0
Total: 3½	28	7	730	406	281	1867	304	314	5

Illumination and Wiring

Electric Sign with Large Moving Element

A spectacular skeleton roof sign recently erected in Chicago has been attracting considerable attention as the main legend upon the sign rotates before the eye of the observer. The sign consists of a framework supporting a 15-ft. hollow steel ball carrying about its equator the legend "Empire Fireproof Storage" in 30-in. illuminated raised letters. A solid steel vertical axle extending through the steel globe rests upon a ball bearing situated in a pent-house on the roof. Driven by a 2-hp motor, also installed in the pent-house, the ball actually revolves. In addition to the main legend the framework of the sign carries a double-faced sign outlining a colored crown and the words "moving" and "packing," in 24-in. letters.

REVOLVING LEGEND ON ELECTRIC SIGN

Tungsten lamps of the 5-watt, 11-volt type have been used to equip the 627 sockets in the sign. These lamps receive their electrical energy from a 3-kw transformer connected to a 110-volt circuit. Those lamps on the moving ball are supplied with energy through slip-rings attached to the axle of the ball inside the pent-house. The sign was erected by the Federal Sign System (Electric).

Convenient Burglar-Alarm Switch

BY J. W. STRIPPEL

In the installation of burglar-alarm apparatus in residences means should be provided so as to permit the owner or occupant to enter the dwelling after the instrument has been set for the night without sounding the alarm. The general method has been to provide the occupant with a Yale key with which he can open the front-door section circuit before entering. Most methods now in use require a number of operations to switch the front-door circuit in again, such as feeling inside the door to turn a switch, thus releasing the key, and turning the switch on again to normal after the door is closed. Another scheme is to operate a cut-off drop on the burglar-alarm indicator, which is reset manually after the person has reached the room.

The weak point of these systems is that the person is liable to forget to restore the section to operating condition, thus leaving the front door unprotected. The following scheme is free from this defect, as it involves the automatic resetting of the circuit. In the diagram *K* represents a switch operated by a Yale key and *R* is a relay with front and rear contacts. The relay should have a resistance of 80 ohms for a 6-volt circuit, 150 ohms for a 9-volt circuit, etc. *DS* represents the usual burglar-alarm door spring.

In operation, the key is inserted in lock *K* and turned. Electricity then flows through the relay *R*, drawing up the armature and breaking the front-door circuit. The door is then unlocked with the proper key and opened, causing the burglar-alarm door spring *DS* to close. Since this contact is then in multiple with the key *K*, the latter can be withdrawn without releasing the relay, electricity flowing from the coils through the front contact, through the burglar-alarm door spring, battery wire, etc. When the door is now closed the

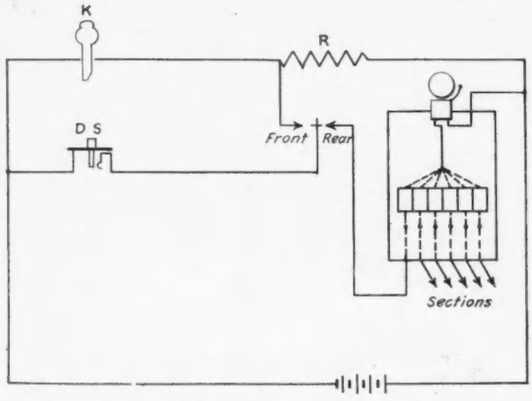


DIAGRAM OF BURGLAR-ALARM CONNECTIONS

contact *DS* will be broken, thereby allowing the relay armature to fall back and to restore the front-door section to normal. Only one extra section wire is required at the front door. The circuit connections are easily understood, and the apparatus is practically foolproof.

Lineman's Bag for Rubber Gloves

Electric-service companies which are having trouble in inducing their linemen to wear rubber gloves when working around dangerous voltages will be interested in the plan which the Wichita Falls (Tex.) Electric Company has adopted to cope with this difficulty.

The principal objection which had to be met was that the linemen had no convenient place to carry rubber gloves because of their bulkiness. The electric-service company has therefore furnished each man with a small leather bag which can be strapped to the body belt over the left hip where it does not interfere with the line tools, which are usually carried on the right half of the belt.

The bag is provided with a large flap cover which is held closed by a snap fastener. Only one hand has to be used in opening the flap and removing the gloves. The bag forms a part of the regular equipment of the

linemen, and as they are required to keep the bag containing the gloves attached to their belt at all times there is no excuse for not using the gloves.

Overhead Distribution without Poles

In the older parts of Manila, Philippine Islands, the streets are very narrow, and in many places the second stories of the houses facing thereon project over the sidewalk and even into the street. Under such conditions it is impossible to erect poles to support electric-service lines, so the conductors are attached to brackets or pipes fastened to the houses. In some cases the wires are strung below the level of the second floors and fastened thereto by insulators.

Noteworthy Lighting in Hotel Concourse

The concourse of the Windsor Hotel, Montreal, P. Q., is one of the social centers of the Canadian metropolis, and, as the accompanying illustration shows, modernized illumination plays an important part in its attractiveness. The concourse, which is daily used as

CONCOURSE, HOTEL WINDSOR, MONTREAL

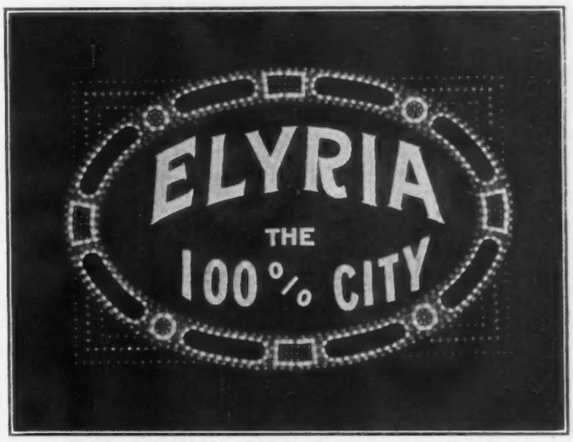
a tea room, is 130 ft. long, 23 ft. wide and 15 ft. high, with white stone walls and ceiling, the floor being of light-colored tiling. Artificial lighting is provided by six semi-indirect fixtures hung 9 ft. 6 in. above the floor, and spaced 19 ft. apart on centers. Each fixture is of the bowl type, 22 in. in diameter and 9 in. deep, and contains eight 60-watt tungsten lamps. The fixtures are each wired to an independent switch in the parcel check-room of the hotel, and energy is supplied by the Montreal Light, Heat & Power Company.

Inverted Magnetite Lighting for Penn Avenue, Pittsburgh

The lighting of Penn Avenue, Pittsburgh, Pa., between Fourth and Eleventh Streets, has been converted to inverted-type magnetite-arc illumination by means of seventy bracket-arm lamps carried on the trolley poles. The lamps are inclosed in diffusing outer globes and, unlike the former suspended-type units, have been lowered to a height of 15.5 ft. above the street level. Messrs. J. F. Froelich and Drew Johnson, of the Duquesne Light Company, had charge of the installation.

Electric Slogan Sign in Elyria

In Elyria, Ohio, "the 100 per cent city," electric service is supplied by R. E. Burger, agent, representing Henry L. Doherty & Company. Following the

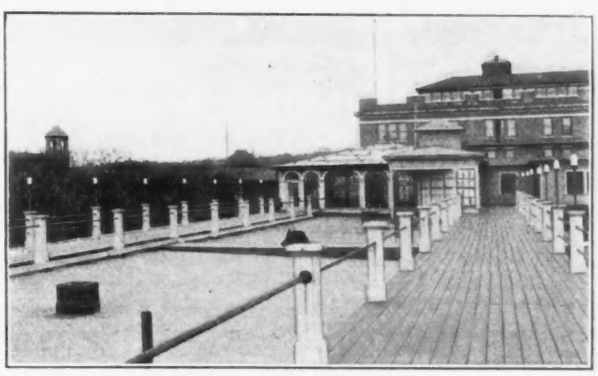


SLOGAN SIGN PRESENTED TO ELYRIA BY DOHERTY ORGANIZATION

Doherty policy, the local concern presented to the city of Elyria a handsome and attractive electric-sign slogan. The sign, which is illustrated herewith, has a particularly fortunate location, being placed on a trunk line of the New York Central Lines (Lake Shore).

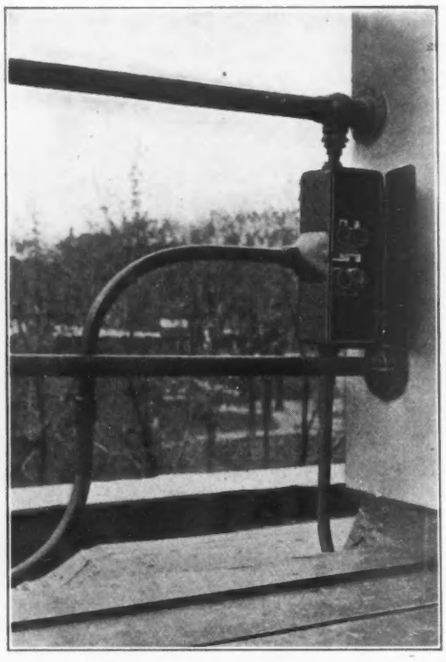
Roof-Garden Lighting Installation

Electric lighting of the promenade is a feature of the roof garden of the Hotel Van Ness, Burlington, Vt., as illustrated in the accompanying halftone. The promenade extends along three sides of the roof, overlooking Lake Champlain, and is 10 ft. wide, its total length being about 312 ft. The lighting installation consists of twenty-seven 50-watt lamps of the metallized filament type mounted in Crouse-Hinds cylindrical opal-glass globes with rounded tops, each unit being placed about 5½ ft. above the walk on a post of 1-in. iron pipe which borders the walk and serves, together with the intermediate pipe railing, as a conduit for the 125-volt supply to the lamps. The globes are 4 in. in diameter and 8 in. high, each being threaded into a metal mois-



ROOF GARDEN, HOTEL VAN NESS, BURLINGTON, VT.

ture-resistant cup 4½ in. in diameter and 2½ in. deep, the cup being threaded into the pipe standard at the top of the latter. The lamps are usually spaced 12 ft. apart on centers, and the roof is fed by two circuits run in



FUSE AND JUNCTION BOX, HOTEL VAN NESS, BURLINGTON, VT.

¾-in. conduit from a 12-in. by 5-in. by 4-in. iron fuse and junction box, illustrated herewith, attached to the rail by condulets. The circuits on the roof are controlled by a switch in the hotel office on the ground floor.

RECENT TELEPHONE PATENTS

Automatic Exchange Devices

In the earlier automatic telephone systems every line required practically a complete set of apparatus, and a very costly system resulted. Many improvements have been made with the purpose of bringing the apparatus nearer to the requirements of continuous service. A patent recently granted to Mr. E. E. Clement, of Washington, D. C., contemplates such an arrangement. He associates each line with relays adapted to connect the line as required to an idle connecting apparatus. Multiple contact relays, each equipped with ten sets of contacts and known as "tens" relays, are associated with single-contact relays called "units" relays. Each line is connected to the same contact in ten of the tens relays in multiple. Tens relays are mounted in banks of ten together with ten units relays. The circuits are so arranged that when a given line calls the circuit of all the tens relays corresponding to the tens digit of that line is closed, as are also all the units relays corresponding to the units digit. Only those relays are active which lie in the bank associated with the first idle trunk or connecting circuit. As soon as these tens and units relays have been operated all other relays of the bank are instantly disabled and locked as long as the calling line is in use. In order to afford a proper distribution of the load the lines are divided into groups, each group having assigned to it a definite and predetermined number of trunks.

Another patent granted to Mr. Clement describes a recording system for automatic exchanges. The operation of the selective apparatus, which picks up the calling line, causes a type wheel to rotate and come to a set with the symbol of the calling line presented to a paper strip upon which the symbol is printed. The patent has been assigned to the Telephone Improvement Company of Attica, N. Y.

Numerous suggestions have been made for combining a fire-alarm apparatus with a telephone system. Mr. John Erickson, of Chicago, has recently patented a signal box for such a combination. For an automatic system a push button on the subscribers' set serves to release the alarm box, which first sends the necessary impulses for selecting the fire-alarm line from the central office to fire headquarters, then following this selection with a signal characterizing the station from which the alarm arrives. If the telephone line is in use as a called line, the fire-alarm signal breaks in and severs the existing connection. If it is in use as a calling station, the call box is restrained until the existing connection has been broken and the switches returned to normal. This patent has been assigned to the Denis General Electric Company.

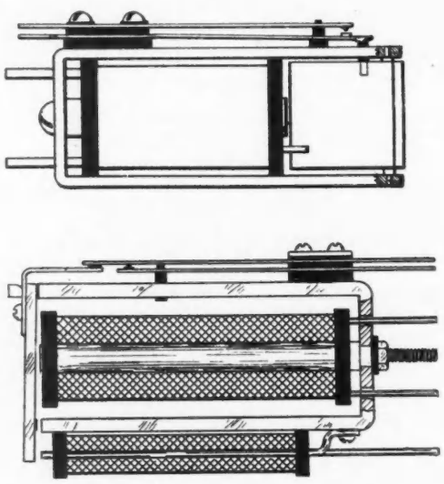
Railway Dispatch Systems

Mr. E. R. Gill, of Yonkers, N. Y., is the inventor of an answer-back signal for railway dispatch systems. His signal is an audible one and is made by including an induction-coil primary in the local vibrating-bell circuit, the secondary of this coil being bridged across the line. This patent has been assigned to the Hall Switch & Signal Company.

Where two or more loud-speaking telephones are near each other one may interfere with the other. A circuit arrangement was recently patented by Mr. H. C. Egerton, of Passaic, N. J., and assigned to the Western Electric Company. When the operator throws his key to one of the circuits, the volume produced by the other circuits is reduced by the introduction of a resistance.

Improved Apparatus

At the top of the illustration reproduced herewith is shown a relay invented by Mr. J. A. Birsfield, of Chicago. The armature swings upon a vertical axis



RELAY AND ELECTROMAGNETIC LOCK

on a pin traveling in a horizontal arc and comes in contact with a cam face formed upon the lower spring to drive it into closed contact with the second spring.

The relay shown in the lower part of the figure is a locking relay controlled by an auxiliary locking magnet. This has been patented by Mr. H. P. Clausen. Both patents have been assigned to the Stromberg-Carlson Company.

A motor-driven telltale apparatus for party lines has been invented by Mr. Thomas Kernan, of East St. Cloud, Minn., for giving notice of the location of an interloping station. The rising receiver hook starts the motor to drive a signal wheel, giving the code of the station. The motor cannot be stopped or the circuits interrupted until the signal is completed.

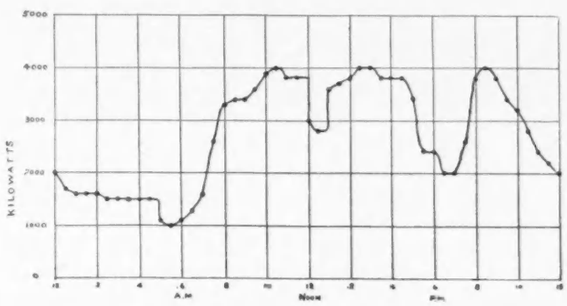
Letters to the Editors

Daylight Peak Due to Motor Load

To the Editors of the Electrical World:

SIRS:—On page 1497 of the June 27 issue of the *Electrical World* there is an article entitled "Daylight Peak Caused by Motor Load at Meridian, Miss.," which is illustrated by a station load curve.

The writer is inclosing herewith a copy of the Houston Lighting & Power Company's load curve for June 25, 1914. This curve, which is representative of conditions



CENTRAL-STATION LOAD CURVE, HOUSTON, TEX., JUNE 25, 1914

for this time of the year for our station, is perhaps even more remarkable than the one for Meridian since it does not include any street-railway business. The load-factor shown is 67.9 per cent, due largely to the motor load and to the fact that isolated plants in the large office buildings and hotels are conspicuous by their absence.

W. W. REED,
Superintendent Houston Lighting & Power Company.
Houston, Tex.

Paralleling Steam and Gas Engine Sets

To the Editors of the Electrical World:

SIRS:—I beg to refer to the article "Paralleling Steam and Gas Engines" on page 37 of your issue of July 4, 1914, in which you recite the impossibility of operating in parallel our 1000-kw gas engine set with our 600-kw steam set.

It is true that after the gas engine was erected we could not obtain successful paralleling between these two units. However, the manufacturers of the gas engine sent their engineers to examine and correct this difficulty and before the appearance of your article the trouble was located and remedied, and we have since been operating to our satisfaction our two directly connected sets in parallel.

I am calling your attention to this fact, as an unintentional injustice has probably been done to the manufacturers of the gas engine, which was the latest unit to be installed at our plant.

A. G. CURTIS,
General Manager Southwestern Gas & Electric Company.
Shreveport, La.

The Determination of Glare

To the Editors of the Electrical World:

SIRS:—In your issue of March 21 Prof. L. R. Ingersoll describes an instrument for measuring the glare of paper, and in your issue of May 23 Dr. P. G. Nutting offers a criticism concerning the factor that Professor Ingersoll measured. It appears that the main point of the matter is yet somewhat obscure. In the first place the instrument does not measure "glare," but measures in arbitrary units a factor which contributes toward the production of glare. Although we are learning to recognize glare, we do not know exactly what causes it, and hence we cannot measure it. Doubtless there are several factors effective in producing a condition known as glare. In the case of glare from paper the decrease in the ability to read is due not only to the annoyance of the "glare spot," but largely to an actual obliteration of contrast between the type and background due to the superposition of a brightness over both the type and background caused by the regular reflection of the image of the light source. The glazed surface is responsible for this condition, and any instrument which will give a measure of the "gloss" should be valuable in obtaining data regarding the desirability of papers for printing.

By taking advantage of the fact that the light regularly reflected by many substances at a certain critical angle is practically completely plane-polarized, Professor Ingersoll has devised a simple instrument for measuring the relative brightnesses of the "glare spot" due to diffusely and also to regularly reflected light. Apparently owing to a confusion of terms, he has left his work open to criticism. Dr. Nutting points out that the glarimeter as devised and used by Professor Ingersoll does not measure the percentage of polarized light. This is quite true, but the writer believes that the measurements as made by Professor Ingersoll are more pertinent to the question of glare than measurements of the percentage of polarized light. However, the writer objects to Professor Ingersoll's specification of his results in terms of "per cent glare." As Professor Ingersoll states, the values determined with his instrument are quite arbitrary because they depend upon the dimensions of the source of light, etc. This is true, for the brightness due to diffusely reflected light depends upon the illumination—that is, in most cases, upon the candle-power of the source divided by the square of its distance from the paper—while the brightness due to specular reflection is quite independent of the distance but varies with the intrinsic brightness of the source.

It appears that measurements of the brightness of the "glare spot" and the brightness adjacent to it—which seem to be what is practically accomplished by Professor Ingersoll's instrument—afford data from which an idea of the desirability of a paper for printing purposes can be obtained. The fact that the instrument described gives data quite dependent upon the construction of the instrument should not militate against its use, for this is the case with many instruments. It is unfortunate, however, that we do not know enough about glare to be able to reduce the measurements to an absolute scale of "per cent glare."

More attention is being given to the matter of glazed paper, and it is to be hoped that specifications of "per cent gloss" will eventually be resorted to by the manufacturer and user of printing paper. Such an instrument as Professor Ingersoll's should be valuable in standardizing papers in respect to gloss.

M. LUCKIESH,
Chairman Committee on Glare from Reflecting Surfaces, Illuminating Engineering Society.
Cleveland, Ohio.

Field of the Operating Engineer

A Record of Practice, Experience, New Ideas and Interesting Problems—Notes on Practical Subjects—Questions and Answers

A Concrete Coal-Storage Pit for Muncie Plant

Excavating a pit 168 ft. long, 50 ft. wide and 17 ft. 10 in. deep, between its station and its new general utility building, the Muncie (Ind.) Electric Light Company is now constructing an under-water coal-storage pit. The floor and the 60-deg. slope will be reinforced with iron bars laid near the surface of the concrete. This reinforcement, it is intended, shall prevent excessive wear from the scraping of the heavy grab-bucket on the bottom or sides of the pit.

The present coal-handling equipment of the station

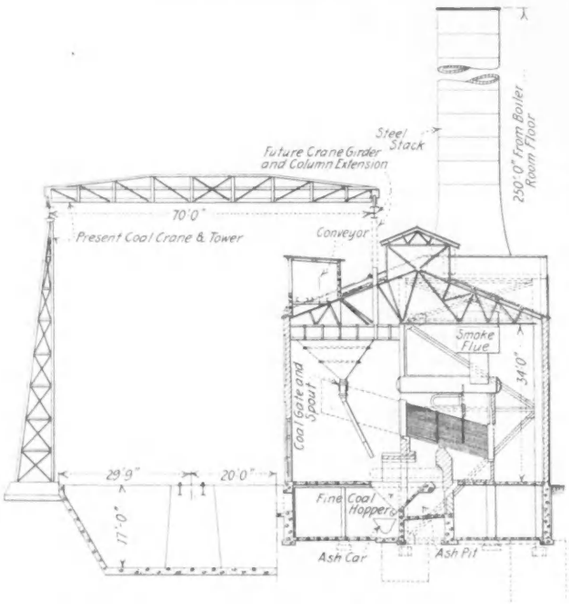


FIG. 2—SECTION THROUGH STATION AND COAL PIT

consists of a coal crane from which is operated a 2-ton grab-bucket, lifting fuel from an open yard and distributing it to the station bunkers. Anticipating the completion of the pit, however, the company has purchased a 20-ton, eight-wheel Orton-Steinbrenner locomotive crane carrying a grab-bucket of the V-type with a capacity of 1.5 cu. yd. The minimum and maximum working radii of this crane with its 55-ft. boom are 13.5 ft. and 57 ft. Acting as a locomotive, it will shift ten 100,000-lb. cars on a straight and level track or will move one similar car up a 2 per cent grade.

In order that this crane may be moved from the storage yard to the coal pit, a track has been laid across the intervening street and over piers placed on 18-ft. centers through the middle of the pit. These concrete piers extend up to the level of the pit, and the track is supported on 24-in. I-beams. When just level full the storage bin will contain 3500 tons of coal, but with the fuel heaped up against the 7-ft. walls constructed along one side and one end 6000 tons may be stored.

Fine coal and cinders from the chain-grate stokers in the station will be returned to separate pits provided in the concrete storage reservoir. The combined cinder and ash pit will occupy a space 36.75 ft. by 50 ft. Water for the entire reservoir will be taken from

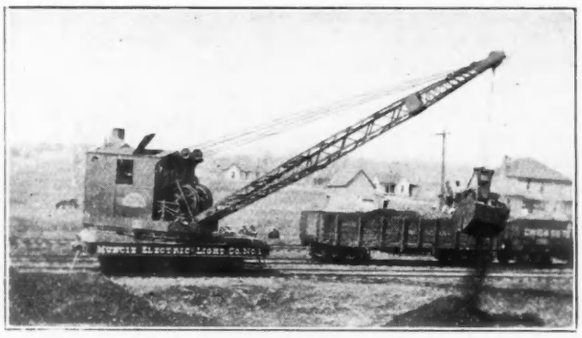


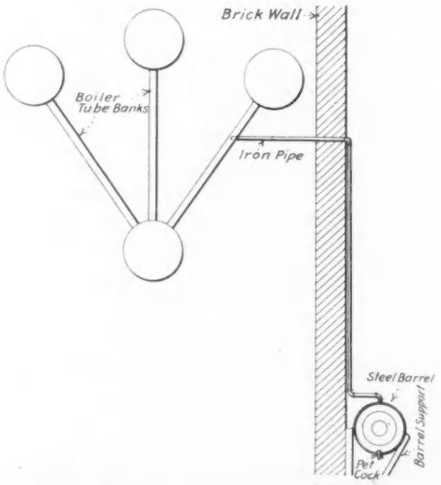
FIG. 1—LOCOMOTIVE CRANE IN USE AT MUNCIE

the adjacent river by means of pumps in the basement of the station.

Among the other improvements being carried out at the present time at the Muncie station are the addition of four 500-hp Babcock & Wilcox boilers, the erection of a 250-ft. by 12-ft. brick-lined steel stack, the erection of a new high-tension substation, and the construction of a 10,000-gal. water softener.

Method of Taking Average Flue-Gas Samples

Of the many different means employed for taking samples of flue gases the one employed at the station of the Danville (Ill.) Street Railway & Light Com-



CROSS-SECTION OF BOILER AND SETTING

pany is one of the most ingenious. As shown in the sketch herewith, a steel barrel is placed on a support attached to the boiler setting and a small steel pipe is extended from the top of the barrel along the brick

wall. Entering the combustion chamber, the pipe is fixed with its open end in the bank of tubes at the last pass.

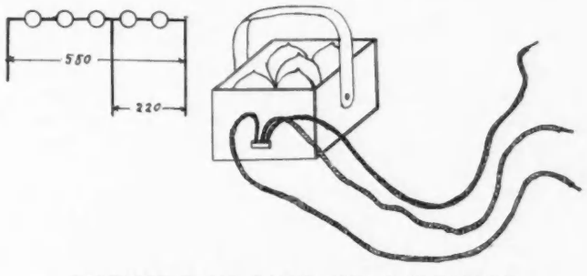
To take a sample of flue gas the barrel is filled with water and the pet cock at the bottom of the barrel opened so that the water on the interior will be entirely drained out in a predetermined period. As the water drips from the barrel the flue gas enters, and at the end of, say, six hours a barrel of gas is available to show the average flue-gas conditions during that period. Tests of samples from the barrel then are made to determine the percentage of each ingredient.

Stringing Conductors with Switching Locomotive

In stringing some 500,000-circ. mil feeder circuits on a pole line in a railway-shop yard recently it was impossible to get sufficient tension with a double block and tackle and a team of horses, so recourse was had to a novel method of stretching the conductors. The two cables being installed had to be strung between the power plant and the machine shop (a distance of 1600 ft.) on fourteen steel poles spaced 100 ft. apart. Both conductors were fastened to a tower on the generating station with Brooklyn strain insulators and Matthews cable clamps and the free ends of the cables were pulled over the pole cross-arms and attached to the drawbar of a switching locomotive in the yard. The locomotive was then started up slowly, and when the sag in the conductors was reduced sufficiently they were tied to the insulators on the last two poles near the machine shop. The installation of the span between the last towers and the shop was completed by using the block and tackle.

Portable Ground Locater

The accompanying drawing illustrates a simple device for locating grounds and open circuits on either 550-volt or 220-volt circuits. It consists of five 110-volt



PORTABLE LAMP BANK AND CONNECTIONS

lamps connected in series and contained in a small uncovered box provided with a handle. The two end terminals as well as a tap between the second and third lamp are connected to flexible cords having different colored insulation to indicate which are to be used in testing.

Avoiding Red Ink on Tracing

In the preparation of location drawings for power apparatus it is often desirable that the building shall be inked in on the tracing with some kind of ink which will produce faint lines on the blueprint, while the working details and principal features of the apparatus itself are distinctly brought out on the print by the use of black ink on the tracing.

The practice of using red ink for the faint lines should be discontinued, for the color is not only injurious and confusing to the eye, but lines or dimensions made with red ink are much more difficult to erase than those drawn with ink of the other colors.

The colors giving the best results appear to be green or blue. Tracings made with either of these colors, using the customary black lines for the apparatus itself, present a pleasing appearance and are easily erased.

Test of 115-hp Locomobile Unit

One of the first American-built locomobiles to go into commercial service has recently been installed in the power plant of the International Cork Company, of Brooklyn, N. Y., by the Buckeye Engine Company, of Salem, Ohio. The set is similar to the "Buckeyemobile" described in these columns Oct. 4 and Dec. 20, 1913.

TESTS ON 115-HP LOCOMOBILE

	Test No. 1	Test No. 2
Per cent normal load	100	120
Brake-horse-power	115	137.8
Revolutions per minute	248	253
Steam pressure	210	212
Saturation temperature, deg. Fahr.	391	391
Steam temperature at throttle, deg. Fahr.	562	596
Initial superheat, deg. Fahr.	171	205
High-pressure exhaust temperature, deg. Fahr.	286	286
Receiver pressure	30	40
Low-pressure inlet temperature, deg. Fahr.	331	347
Low-pressure superheat, deg. Fahr.	45	61
Low-pressure exhaust temperature, deg. Fahr.	209	210
Feed-water temperature, deg. Fahr.	192	194
Temperature gases at superheater, deg. Fahr.	643	730
Temperature gases base of stack, deg. Fahr.	398	424
Total steam per hour	1574.5	1845
Steam per brake-hp-hr., lb.	13.7	13.4
Steam per kw-hr., lb.	22.9	21.3
Total coal fired per hour	156.4	180
Coal per brake-hp-hr., lb.	1.36	1.31
Coal per kw-hr., lb.	2.27	2.12
Boiler and superheater efficiency	82.3	85.3
Thermal efficiency of engine	16.2	16.2
Thermal efficiency of unit	13.3	13.8
Heat value of coal, per lb.	14,074	14,074

The tandem compound engine of the locomobile drives a 75-kw alternator, which supplies energy to a number of small motors driving machinery used in the manufacture of cork and metal bottle stoppers. The engine is run non-condensing, as were the acceptance tests, in which a consumption at normal load of 13.7 lb. of steam and 1.36 lb. of coal per brake-hp-hr. was obtained. The fuel used in the tests was a Pocahontas coal of 14,074 lb.-Fahr. units. In the accompanying table are given the average results of the acceptance tests, as furnished by Mr. R. P. Williams, chief operating engineer of the International Cork Company.

A Hoisting Problem

Can a direct-current motor rated at 110 volts and 9 amp lift 5000 lb. in one minute? A. H.

In one minute the motor described should lift 5000 lb. through a height of about 5 ft. A current of 9 amp at 110 volts represents 990 watts, or, dividing by 746, the number of watts in a horse-power, 1.325 hp. As the combined efficiency of the motor and hoist is not likely to be above 60 per cent, the power available for use will be 0.60×1.325 hp, or 0.796 hp. Since, from the familiar definition, 1 hp is equivalent to 33,000 ft.-lb. per minute, the power available may be expressed as $0.796 \times 33{,}000$ ft.-lb., or 26,230 ft.-lb. per minute. Dividing this by the weight to be lifted, 5000 lb., the result obtained—5.25 ft. per minute—gives the rate at which the load would be lifted.

Digest of Current Electrical Literature

Abstracts of Important Original Articles Appearing in the Periodical Electrical Press of the World

Generators, Motors and Transformers

Construction of Electrical Machines.—G. Pontecorvo.—An illustrated article on the construction of dynamo-electric machinery from steel and copper. Frames, bearings, feet, ground-plates, etc., are made from steel plates by rolling, punching and stamping. The article describes the practice of the Westinghouse company in this direction.—*Elec. Zeit.*, June 25, 1914.

Mercury Rectifiers.—A note on a recent British patent (No. 15,392, 1913) of the British Thomson-Houston Company and the General Electric Company of this country. The object is to prevent "reverse arcing" between the electrodes which normally act as the anodes. The anodes, which may be of any suitable metal such as iron or tungsten, are made hollow and filled with mercury which is kept heated at its boiling point by independent heating coils immersed in the mercury. As the mercury is vaporized, it passes into a condensing chamber and thence returns to the hollow interior of the anode. A method of sealing the anodes where they enter the rectifying chambers so as to allow for adaption to changes of temperature without allowing any air to enter the evacuated interior of the rectifier is also included in the specifications.—London *Elec. Eng'ing*, July 2, 1914.

Lamps and Lighting

Standardization of Metallic Filament Electric Lamps.—At the recent general meeting of the (British) Incorporated Municipal Electrical Association a report was made by the committee on standardization of metallic-filament electric lamps. In November, 1913, a meeting of the engineering standards sub-committee was held, which the representatives of the I. M. E. A. attended. At the council meeting of the I. M. E. A., held during the morning of the same day, the question of rating metallic-filament lamps was fully discussed, and it was unanimously resolved that the standard rating of metallic-filament lamps should be in watts and not in candle-power. "The I. M. E. A. representatives urged the adoption of watt marking only. They found themselves in direct antagonism with representatives of the War Office, the Admiralty, the Post Office and the Public Works, all of whom were tied down to vote under the direction of their respective departments, though as a matter of fact, they were personally in sympathy with the views of the I. M. E. A. A letter was subsequently sent to the Tungsten Lamp Association, informing them that the standards committee, by the majority of the votes from government officials on that committee, had decided to adopt the standard of marking both the candle-power and the watts on lamps. The I. M. E. A. strongly objected to this, and urged the Tungsten Association still to adhere to the resolution already adopted by it in regard to watt marking only. The Tungsten Lamp Association in reply expressed its hearty approval in support of the marking of all lamps with watt rating only. The only exceptions made by the members of the association were where government departments made specific requests for candle-power markings. It is obvious from what took place and from the views expressed by the representatives of government departments, that their interests in the matter do not harmonize with the interests of the public supply authorities, and thus matters have practically come to a deadlock so far as the association and the engineering standards committee are concerned. The council and the lamp manufacturers are in agreement with regard to wattage rating, but it is not likely that a specification will be issued by the standards committee which will be acceptable to the members of the association unless the contemplated rearrangement of the standards committee should result in considerable change in its constitution."—London *Electrician*, June 26, 1914.

Generation, Transmission and Distribution

Long Transmission Lines.—U. del Buono.—A mathematical article, illustrated by numerous diagrams, on the calculation of a long transmission line and the determination of the characteristic constants of the line.—*La Revue Elec.*, June 19, 1914.

Steam Turbine.—J. Morrow.—An illustrated description of the Ljungström steam turbine which is a radial-flow turbine of the reaction type. It differs from the other reaction turbines in that the alternate rows or rings of blades move in opposite directions. In the Ljungström turbine prominence is given to three important factors, namely, high efficiency, satisfactory working with superheated steam, and small size for a given output.—London *Electrician*, July 3, 1914.

Traction

Magnetic Coupling.—An illustrated article on a small storage-battery locomotive which serves for switching cars in the car houses of the Swiss federal railways. The special feature of this locomotive, which was designed by Kull, is the system of magnetic coupling of the car with the locomotive. The engineer of the locomotive brings it to the car to be switched, buffer against buffer and then turns on the electric current which magnetizes the buffers so that the car is coupled to the locomotive. This saves time and expense for wages and also avoids accidents. The locomotive is equipped with a storage battery of 60 cells of 120 amp-hours capacity, of the same type as are employed for lighting the cars on the Swiss railways. These batteries have normal charge and discharge current of 40 amp. Their total weight is 1400 kilograms. The locomotive is equipped with a 110-volt 5-hp direct-current series motor.—*La Lumière Elec.*, June 13, 1914.

Automatic Block Signals.—A criticism by R. Pfeil on G. Kemman's recent paper relating to the introduction of the automatic block signal system on the Berlin elevated railway and subway, with a reply by G. Kemman to this criticism.—*Elek. Zeit.*, July 2, 1914.

Installations, Systems and Appliances

State Ownership of Swiss Central Stations.—The districts of Aargau, Glarus, Zurich, St. Gallen, Thurgau, Schaffhausen, Schwyz, Apponzell, and Zug have formed the North Eastern Swiss Power Company which will take over the Beznau power plant on the Aare and also the Loentsch power plant. The maximum power available in winter is 6000 kw for the

former and 36,000 kw for the latter, so that the combined rating is 42,000 kw, and the energy which can be generated per year is 125,000,000 kw-hr. The company will also erect a new hydroelectric station at Eglisau. The total energy obtainable per year from the three stations will be 171,000,000 kw-hr.—*Elek. Zeit.*, June 18, 1914.

Electrical Industry of Austria and Hungary.—EMIL HONIGMAN.—A review of the status of the electrical industries in Austria and Hungary during the year 1913, the conditions of manufacture and import and export trade, with numerous statistical tables and diagrams.—*Elek. u. Masch.* Vienna), June 14, 21 and 28, 1914.

British Municipal Electrical Association.—An account of the proceedings of the annual general meeting of the (British) Incorporated Municipal Electrical Association, at Birmingham. Mr. H. Richardson of Dundee is the new president. The membership now stands at 379. Brief accounts are given of the work of the committees.—London *Electrician*, June 26, 1914.

Wires, Wiring and Conduits

Wood Impregnation.—JEAN ESCARD.—The first part of an article on processes of impregnation for the wooden poles of transmission lines. Three different kinds of processes are distinguished: First, impregnation by simple immersion; second, impregnation under pressure, and third, chemical and electrochemical processes.—*La Lumière Elec.*, June 27, 1914.

Electrophysics and Magnetism

Photo-Electrons.—W. H. KADESCH.—An account of an experimental investigation of the energy of photoelectrons emitted from sodium and potassium as a function of the frequency of the incident light. The results may be expressed by an equation of the form, $V = Kn - V_0$; in which V is the difference of potential in volts between the electrode and the adjacent parts of the tube, which is just sufficient to prevent a deflection of the electrometer, n being the frequency of the incident light, and K and V_0 being constants.—*Phys. Rev.*, May, 1914.

Discharges of Electricity.—J. S. TOWNSEND AND P. J. EDMUNDS.—A brief paper on the discharge of electricity from cylinders and points with air pressures ranging from one to 760 mm.—*Philos. Mag.*, May, 1914.

Hall Effect in Flames.—HAROLD A. WILSON.—An illustrated account of experiments which were undertaken with the object of measuring the Hall effect in a Bunsen flame containing different alkali salts under conditions which would permit the full value of the Hall effect gradient to be observed. The results obtained show that the Hall effect is nearly independent of the conductivity of the flame and of the current passing through it, in agreement with the theory.—*Phys. Rev.*, May, 1914.

Positive Ions in Flames.—A. H. SAXER.—An account of an experimental investigation of the nature and the velocity of migration of the positive ions in flames. The maximum velocity of the positive ions of the colorless Bunsen flame is 1.8 cm per second when measured in the flame itself, where the temperature is 1250 deg. C., and 2.5 cm per second when measured in hot air at a temperature of 475 deg. C. These ions have their velocities reduced in the presence of alkali salt vapors. The velocity of the positive ions of the various alkali salt vapors is less than the velocity of the positive ions of the pure flame. These ions are the nuclei of large molecular aggregates, and they carry with them the spectrum of the metal used in their production.—*Phys. Rev.*, May, 1914.

Units, Measurements and Instruments

Electro-Magnetic System for Measuring Instruments.—At the recent exhibition of the French Physical Society an electromagnetic system for measuring instruments due to Da and Dutilh was shown which is based on both attraction and repulsion. As shown in Fig. 1,

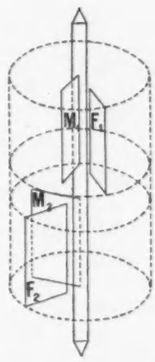


FIG. 1—ELECTRO-MAGNETIC SYSTEM FOR MEASURING INSTRUMENTS

the principle of operation comprises two identical systems one above the other, mounted on the same axis and displaced from each other by a certain angle. The movable plates M_1 and M_2 are repelled by the fixed plates F_1 and F_2, but when the deflection becomes so large that the repulsion decreases considerably (which manifests itself by a bent in the calibration curve), the plate M_1 will approach the fixed plate F_2 of the other system and the resulting attraction will be superposed on the former repulsion. In this way it is possible to obtain any form of calibration curve desired.—*La Revue Elec.*, June 5, 1914.

National Physical Laboratory.—An editorial note on the recent annual inspection of the (British) National Physical Laboratory and extracts from the report of the executive committee for the fifteen months from January, 1913, to March, 1914.—London *Electrician*, June 26, 1914.

Galvanometer.—At the recent instrument exhibition of the French Physical Society a design was shown in which Carpentier has taken up a form of the Deprez d' Arsonval Galvanometer developed in 1887. The principle is indicated in Fig. 2. One side-arm of the mov-

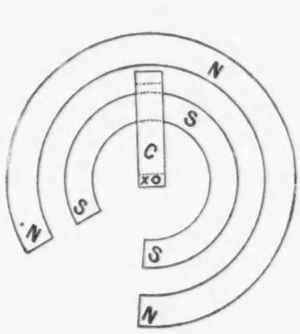


FIG. 2—GALVANOMETER

ing coil C coincides with the axis of rotation O while the other parallel side-arm moves in a uniform radial field produced between the concentric pole pieces N and S. The deflection is proportional to the current.—*La Revue Elec.*, June 5, 1914.

Exhibit of Instruments.—Illustrated descriptions of the various exhibits of instruments and apparatus at the recent annual exposition of the French Physical Society in Paris.—*La Revue Elec.*, June 5 and 19, 1914; *La Lumière Elec.*, June 6, 13 and 20, 1914.

Absolute Measurement of the Standard of Electrical Resistance.—In the recent annual report of the (British) National Physical Laboratory mention is made of the extended researches by F. E. Smith which have recently been brought to a termination, the result being that the length of the mercury column having at 0 deg. C. a resistance of 1 ohm is found to be 106.245 cm, as compared with that of 106.300 cm, the figure adopted for the international ohm. In other words, one international ohm equals 1.0052×10^{7} c.g.s. units of resistance.—London *Electrician*, June 26, 1914.

Power Factor Meter.—At the recent instrument exposition of the French Physical Society a power-factor meter of Carpentier based on a principle of Pestarini was exhibited, the arrangement being shown in Fig. 3. It is a combination of two double wattmeters with revolving field. Each of the double wattmeters is connected to the three-phase system, but in one of the double wattmeters the shunt coils are in series with resistances and in the other double wattmeters in shunt

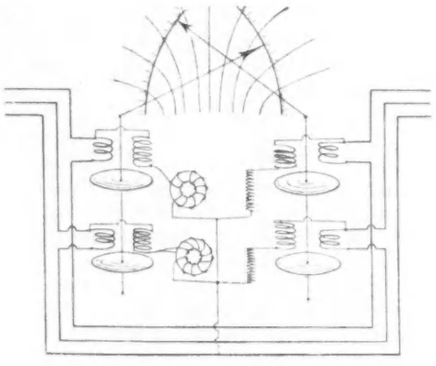


FIG. 3—POWER FACTOR METER

with induction coils. The two systems are placed in the same case. One of the two double wattmeters indicates the real power, the other the wattless power and the point of intersection of the two needles of the two wattmeters gives directly the power factor.—*La Revue Elec.*, June 5, 1914.

Telegraphy, Telephony and Signals

Wave Transmission on Telephone Lines.—L. CAHEN.—Two further mathematical articles on applications of the general formulas for the transmission of sinusoidal currents over lines. In the present instalments the author gives the theory of reflections of waves on several lines in series.—*La Lumière Elec.*, May 16 and 23, 1914.

Miscellaneous

Electrical Industries of England.—A. A. BRANDT.—The author gives a review with statistical tables of the development and the present status of the electrical industries of England on the basis of a paper by W. Koch (*Technik und Wirtschaft*, Vol. 7, pages 141, 254, 360, 1914) and a paper by F. Haardt (*Handelsmuseum*, Vienna, Vol. 28, page 589, 1913).—*Elek. Zeit.*, July 2, 1914.

Lightning Rods.—S. RUPPEL.—The author emphasizes that every building should be provided with a lightning rod, but in order to enforce this rule suggests that the construction of lightning rods should be simplified as much as possible. Only one rule is necessary. It is that every building should be provided with a continuous metallic conductor which reaches from the upper parts of the building and is connected with the gas and water pipes and all larger metallic parts in the building. It is quite wrong, the author insists, to claim that a lightning rod which is not built with absolute accuracy, according to very stringent requirements, is more dangerous than beneficial. What are really needed are not a few absolutely perfect lightning rod installations but as many as possible of the simplest construction.—*Elek. u. Masch.* (Vienna), June 21, 1914.

Book Reviews

FURNACE EFFICIENCY. COMBUSTION AND FLUE GASES. By James C. Peebles. Chicago: The Joseph G. Branch Publishing Company. 156 pages; 69 illus. Price, $1.50.

The first part of this book is devoted to a brief explanation of the chemistry of combustion and a description of the Orsat apparatus for analyzing flue gases. On this as a foundation, the author proceeds to show how to determine the causes of low efficiency, mentioning particularly excess air due to leakage and to too strong a draft. A chapter is given over to the cause and prevention of smoke, and includes the Ringelmann chart for smoke observations. The greater part of the book deals with appliances designed to insure smokeless combustion and high furnace efficiency, as, for example, smokeless furnaces, the Wilsey fuel economy gauge, the Blonck efficiency meter, chain-grate and under-feed stokers, and the Murphy furnace. The final chapters give furnace-arch data and point out faults to be avoided in the arrangement of breechings. The book is written for all interested in efficient steam plants, from manager to fireman. The book should be of interest to the class for which it is written, though its effectiveness is lessened by the use of catalog halftones that lack clearness and detail, and by the wide range of subjects touched upon in the limited scope of its pages.

THEORIE DER WECHSELSTRÖME. By Dr. Ing. Alfred Fraenckel. Berlin, Germany: Julius Springer. 336 pages, 198 illus. Price 10 marks.

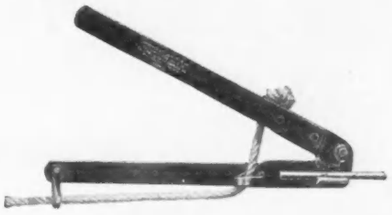
In treating of the theory of alternating currents, Dr. Fraenckel uses the symbolic method with which most electrical engineers are now familiar. The author starts with definitions, and the progress toward the more difficult subjects is gradual and logical. The sine wave assumption is, of course, made, although one of the best chapters in the book is devoted entirely to irregular wave shapes. The Fourier series is explained and various methods of harmonic analysis are presented in succession. The ground is very thoroughly covered. Polyphase currents are treated briefly, but in an adequate manner so far as the theoretical study is concerned. There are chapters relating to mutual induction, with magnetic lines in air; the effect of iron in the magnetic circuit; inductance and capacity; effect of magnetic leakage; power diagrams for transformers and induction motors, transient phenomena; traveling waves, etc. The printing is good and the book reflects credit on both the publisher and the author.

New Apparatus and Appliances

An Illustrated Descriptive Record of Recently Developed Manufactured Products of Interest to Electrical Readers

Device for Picking Up Broken Trolley Wire

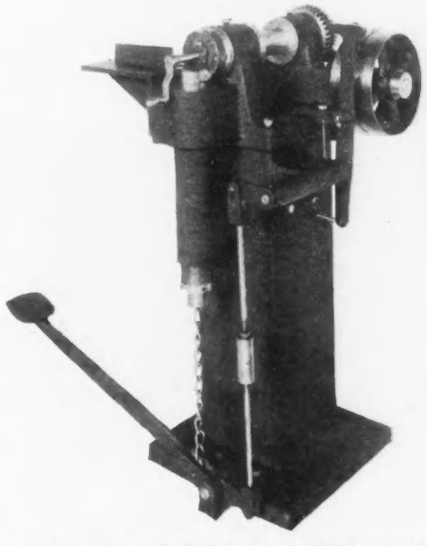
In the accompanying illustration is shown a device for picking up a broken trolley wire. The device consists of malleable-iron jaws and a long fiber handle. Either manila or cotton rope may be used. The operator picks up the wire with the jaws, pulls the rope over a span wire or bracket to hold up the wire, and then the car is made to coast by. This "St. Louis trolley pick-up," as it is called, is being made by the Electric Service Supplies Company, Seventeenth and Cambria Streets, Philadelphia, Pa.



PICK-UP DEVICE FOR BROKEN TROLLEY WIRES

Copper-Coil-Forming Machine

The machine shown in the accompanying illustration is designed to coil copper field coils for automobile lighting systems. It takes the copper in strips and coils each strip with a strip of insulation on a rectangular arbor. The copper strip is not only cut to length, but is also given a right-angle bend at one end, which is used for dogging purposes. A powerful spring keeps the work against the arbor and is controlled by a foot treadle. The machine trips automatically on the completion of three revolutions of the spindle. Coils are stripped from the arbor by turning the crank handle shown in the center of the spindle. This machine, which is being manufactured by the Garvin Machine Company, of New York City, weighs 665 lb. crated.



MACHINE FOR FORMING COPPER FIELD COILS

Portable Wireless Apparatus for Army Signal Corps

A portable wireless outfit, which is designed to send messages, under favorable conditions, within a radius of 800 miles and which, it is claimed, can be set up for use in twelve minutes, was recently put into commission by the United States Army Signal Corps. Energy for the operation of this apparatus is obtained from a generator mounted on a truck which is connected by a train of gears to the 30-hp engine of the truck. The generator delivers energy at 110 volts; and this pressure is transformed to 22,000 volts for the wireless equipment.

FIG. 1—SETTING UP WIRELESS APPARATUS IN FIELD

The antennæ are of the umbrella type, and are mounted at the top of an 85-ft. mast which is built in nine sections. The first or top section is raised by hand, but the other sections are lifted by a block and tackle suspended from struts mounted on the roof of the truck. These struts can be quickly detached when not in use. The guy wires are attached to the fifth section of the mast. When dissembled, the nine sections of the mast are carried in long compartments built along both sides of the truck. The counterpoise, or artificial ground, consists of heavy insulated wires radiating from a common center to which is attached

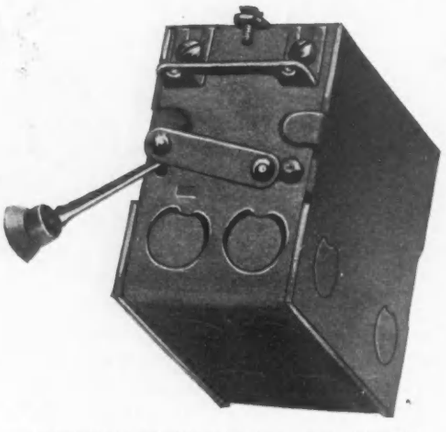
the ground wire of the set. For convenience in grounding there is a socket on the outside of the truck body into which a ground-wire plug fits. In Fig. 1 soldiers are shown rigging up the wireless outfit, and in Fig. 2

FIG. 2—REAR AND INTERIOR VIEW OF THE TRUCK

is shown a rear view of the truck, which was made by the White Company, Cleveland, Ohio.

Pressed-Steel Switchbox

A spacer-type pressed-steel switchbox is being made by the Chelten Electric Company, Philadelphia, Pa. This box is so constructed, the manufacturers declare, that there are no loose parts. Pins held in place by rigid flat springs are used instead of screws which are

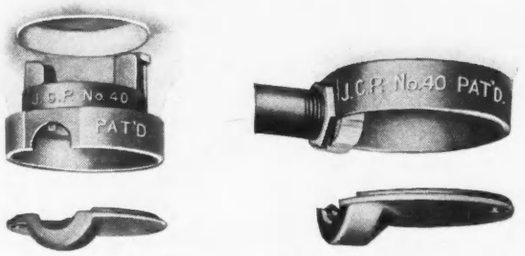


SECTIONAL PRESSED-STEEL SWITCHBOX

likely to be lost. To gang this box it is only necessary to remove the side by inserting a screw-driver, penknife or other sharp tool under the spring, raising the latter to the upper position as shown in the illustration. With the spring in this position the side can be readily pulled off, and a spacer may then be put in place. The side removed from the box is then placed at the end of the spacer, and the two-gang box is ready for use. Should larger gang boxes be required, it is only necessary to add extra spacers. This box is also made in deep and shallow types for pipe and loom work as well as with clamps for use with flexible conduit.

Outlet Box Attachment

The outlet box attachment shown in the accompanying illustrations is designed for extending conduit from an outlet-box cover plastered into the ceiling. In Fig. 1 is shown the fitting ready to be inserted into an open outlet-box cover. In Fig. 2 the attachment is



FIGS. 1 AND 2—OUTLET-BOX ATTACHMENT READY TO BE INSERTED AND PLACED IN POSITION

seen as it appears on the ceiling after having been attached to the outlet-box cover and after the conduit is connected to the fitting, the cover being removed. This fitting can be easily and securely attached, the manuf[illegible]urer declares, and no special screws or lugs are n[illegible]sary. This J. C. P. outlet-box attachment, No. 40, [illegible]s it is called, is made by Mr. J. C. Phelps, Springfield, Mass.

Bed-Lamp Fixture

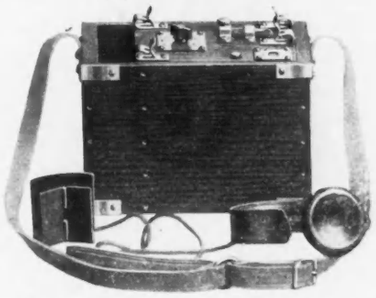
The fixture shown herewith is equipped with a hook so that it can be hung on any convenient bed rail, back of a chair, or other support. It is designed for use in hospitals and doctors' offices, and the patient is enabled

FIXTURE FOR USE AT THE BEDSIDE

to read with it while lying down. The lamp is adjustable, and the light area can be moved from place to place by moving the lamp about the pivoted hinge. This lamp may be used with a specially made stand which can be placed beside the bed. The Shiras-Chassaing Electric & Manufacturing Company, St. Louis, Mo., is the maker of this device.

Cable-Testing Instrument

An instrument designed for testing cables, finding grounds, crosses and short-circuits, and for tracing concealed wires is being made by Stewart Brothers, Ottawa, Ill. With underground cables an exploring coil is applied at various manholes, and a tone can be heard in

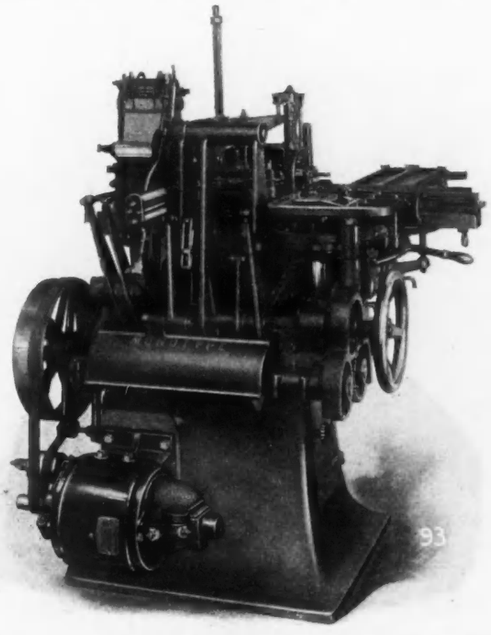


INSTRUMENT FOR TESTING CABLES

the receiver whenever the coil is placed between the sender and the fault, providing the circuit is complete. If the tone, however, can be heard in one manhole and not the next, the trouble is between these two manholes. On aerial cables the exact location of the trouble can be determined. This tester can also be used to find crosses between metal ceilings and electric circuits.

Linotype Protected Direct-Current Motor

In the accompanying illustration is shown a direct-current motor designed for operating linotype and monotype casting machines. When used with linotype machines the usual method of mounting the motor is to place it on a separate base under the step of the



INCLOSED MOTOR FOR OPERATING MONOTYPE MACHINE

machine. When used with monotype machines, the motor is usually mounted in a semi-inverted position on the base of the machine as shown in the illustration. The motor is equipped with an idler-pulley attachment for adjusting the tension of the belt, and this attachment is mounted on the end in such a way that it can be adjusted at any angle desired. To prevent hot metal falling on the commutator, brushes or windings, the end-heads are inclosed by removable covers which are provided with fine-mesh screens. This form of covering gives ample protection without interfering with the ventilation of the motor. The motor is equipped with no-voltage-release starters which are designed for operation on 115-volt, 230-volt or 500-volt circuits. The Robbins & Myers Company, Springfield, Ohio, is placing this motor on the market.

Push Buttons

The push buttons illustrated herewith are being made by the Wil-Bar Manufacturing Company, 22 Clark

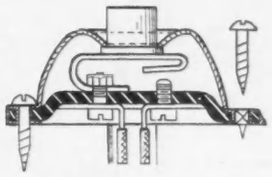


FIG. 1—ROUND PUSH BUTTON

Court, Detroit, Mich. No parts can be lost, the manufacturers declare, and the devices can be installed so that

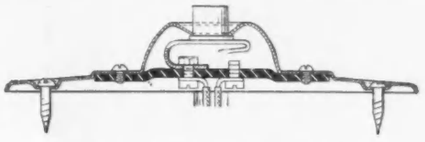
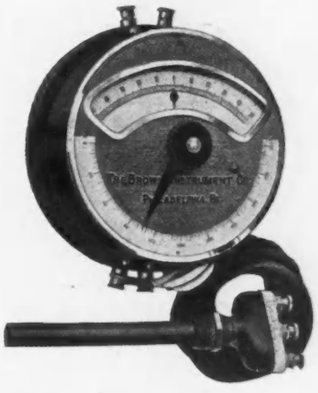


FIG. 2—OVAL PUSH BUTTON

the backs are firmly held in place. In Fig. 1 is shown a sectional view of a round push button and in Fig. 2 one of the oval type.

Resistance Thermometer

A resistance thermometer designed to measure at a central location temperatures from 200 deg. below zero Fahr. to 1800 deg. Fahr. is being placed on the market by the Brown Instrument Company, Philadelphia, Pa. The instrument is equipped with a bulb or coil of



RESISTANCE-WIRE THERMOMETER

resistance wire, the resistance of this wire changing with changes of temperature. Bulbs placed at numerous points around a plant or building are connected by three-wire cable to the indicating instrument and switchboard, which can be placed at any desired position. In determining the temperature all that is necessary is to switch any bulb on to the indicating in-

strument. If a constant temperature is to be maintained, the pointer on the indicating instrument, shown herewith, can be adjusted to this temperature and the deflection of the pointer on the upper scale will show the increase or decrease in temperature. This instrument can be operated with either dry cells or storage batteries, or 110-volt or 220-volt direct current.

Tool Holder

A tool holder for round and star drills is being placed on the market by M. B. Austin & Company, 700 Jackson Boulevard, Chicago, Ill. This tool can be used as a drill handle for drilling brick and concrete walls,

DRILL HANDLE

sidewalks, etc. By its use the danger of injuring the operator's hands is minimized. The drill can also be kept from wedging with this tool so that the drill can be withdrawn at any time.

Stage Arc Lamp

A portable arc lamp for use in taking motion pictures and for making photographs in studios, ateliers, thea-

PORTABLE STAGE ARC LAMP

ters, etc., is being placed on the market by the Universal Electric Stage Lighting Company, 240 West Fiftieth Street, New York. The lamp is mounted on a wrought-iron stand equipped with castors for easy transportation. An adjustable inclosed rheostat is fastened to the bottom of the stand as shown in the accompanying illustration. This rheostat is wound to take 20 amp to 35 amp at 110 volts and is well ventilated. The switch is also inclosed. The hood holding the arc lamp is made of galvanized steel with grooves in the front for slides. A small windlass is provided for raising and lowering this hood. Two sets of electrodes (four carbons in all) are used, and the mechanism operating them is automatic. The lamp can be used with either alternating current or direct current.

Unit-Type Panel Board

Panel boards with units made up of four parts are being manufactured by the Bryant-Perkins Companies, Bridgeport, Conn. Each unit consists of a base which carries all the conductors and connections to the circuits, two switch mechanisms which drop into apertures in the base, and a cover which is held in place by the

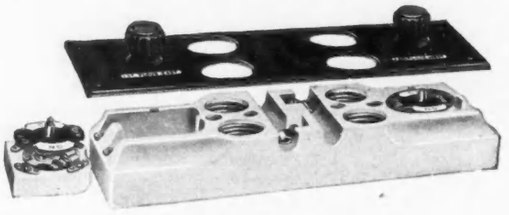


FIG. 1—DISASSEMBLED PANEL UNIT

switch knobs and fuse plugs. No live parts are accessible from the front. In case a switch mechanism requires adjustment or repair, the cover of the particular unit affected can be quickly removed, and the switch mechanism lifted from its socket. It can then be inspected and repaired without danger of short-circuit. The words "On" and "Off" are printed in black letters

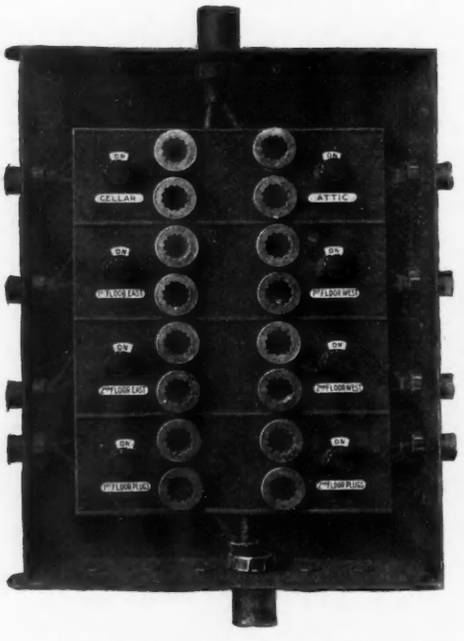
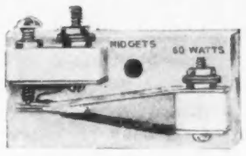


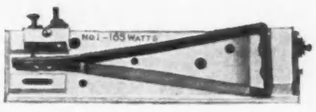
FIG. 2—FOUR-UNIT PANEL BOARD

on a white background and in white letters on a black background respectively. The fuses are self-indicating and can be replaced without the use of screwdrivers or other tools. In Fig. 1 the parts of a single unit are shown disassembled, and in Fig. 2 is seen a panel board made up of four units.

Automatic Flashers for Single Lamps and Large Signs

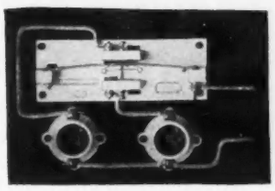
So-called "thermo-blink" automatic flashers of various types are being placed on the market by Kelley & Kelley, 105 Liberty Street, Brooklyn, N. Y. In Fig. 1 is shown a flasher 1.125 in. wide and 2.25 in. long for

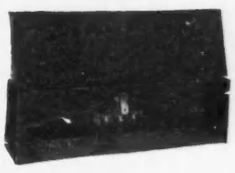




FIGS. 1 AND 2—ONE-LAMP AND ONE-TO-THREE-LAMP FLASHERS

use with a single 16-cp lamp. It is equipped with porcelain base and platinum contacts. The flashing period can be regulated by adjusting the platinum-pointed screw. The flasher shown in Fig. 2 is for use with





FIGS. 3 AND 4—FLASHER FOR TWO CIRCUITS OF LAMPS AND FLASHER FOR LARGE SIGNS

from one to three 16-cp lamps. The flasher illustrated in Fig. 3 is designed to flash two lamps or two circuits of lamps alternately. In Fig. 4 is shown a flasher for large electric signs. In this device the arc is disrupted in a mercury tube sealed from the air.

Asbestos Heating Pad

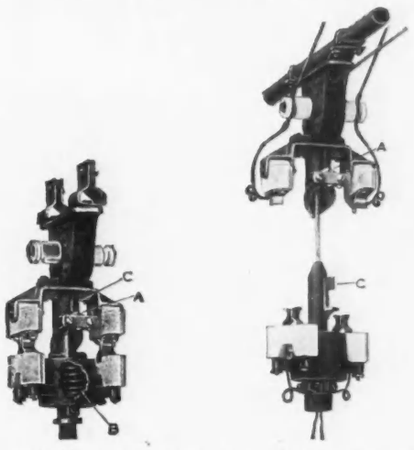
An asbestos pad heated electrically is being placed on the market by the H. W. Johns-Manville Company, New York. This "J-M electrotherm," as it is called, is designed to take the place of the hot-water bottle, and is therefore particularly well adapted for sick-room use. By means of a switch the temperature can be gradually increased, so that often the patient can as a result withstand higher temperatures than would be possible if a

HEATING PAD

hot-water bottle were applied suddenly at the maximum temperature. This heating device is made in several sizes. One for general use is covered with eiderdown and measures 11 in. by 15 in. Another is covered with rubber and is used as an operating-table pad. Others are in the form of sweating jackets, collars and caps. An "electrotherm" bed quilt with a washable cambric cover for use by patients sleeping outdoors is also being made by the same company.

Single-Cord Cut-Out Hanger

A single-cord cut-out hanger for incandescent lamps or for arc lamps in multiple circuits is being made by the Thompson Electric Company, Cleveland, Ohio. The electrical connection is in the form of two simple knife contacts forced together by the spring *B* shown in Fig. 1. When in the operating position the lamp is



FIGS. 1 AND 2—HANGER IN OPERATING POSITION AND HANGER WITH CIRCUIT DISCONNECTED

secured by the pawl *A*. The lamp is lowered to the ground by pulling it up as far as it will go and giving it a quick release, as in operating a spring window shade. This action throws the pawl *A* back out of

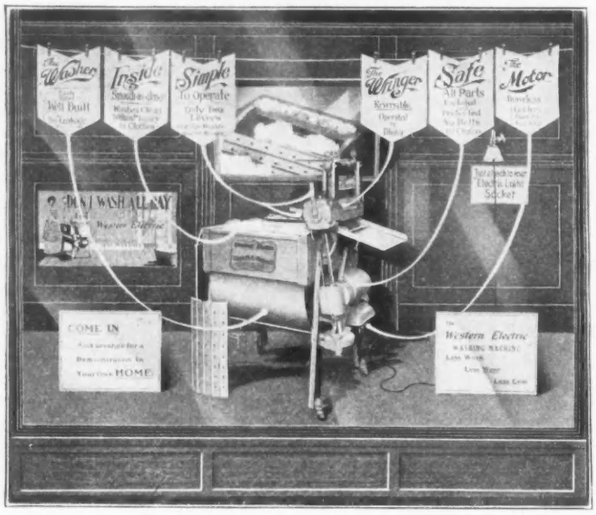
FIG. 3—HANGER IN OPERATING POSITION CONNECTED TO LAMP

the catch *C;* then by releasing the cord quickly the catch passes out before the pawl can drop back into place. In returning the lamp to the operating position it is raised as far as it will go and then released slowly, thus allowing the pawl to fall into place. In Fig. 2 is shown the hanger with the circuit broken. Fig. 3 shows the hanger in the operating position supporting a lamp and its reflector.

Jobber, Dealer and Contractor

Helping the Dealer to Sell Washing Machines and Electric Fans

Some of the methods used in selling fans, which were described in the *Electrical World* of May 16, have been adopted by the Western Electric Company to dispose of its washing machines. As in the fan-selling cam-



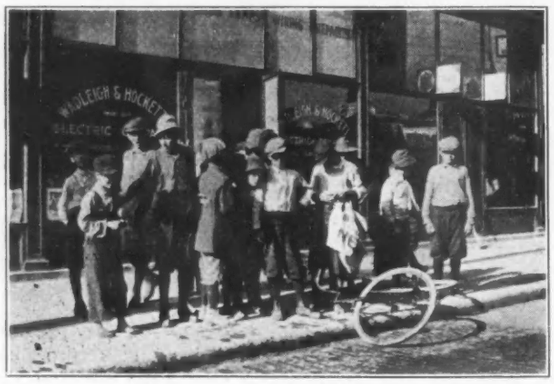
TYPICAL WINDOW DISPLAY FOR WASHING-MACHINE SELLING CAMPAIGN

paign, the company undertakes to educate the dealer and to supply him with various advertising helps.

A large illustrated folder has been sent broadcast to dealers, telling of the ways in which the company will co-operate. This folder also illustrates various newspaper advertisements, lantern-slides for moving-picture theaters, material for window displays, mailing folders and display cards for street cars. Herewith is shown a typical window display suggested, all the material excepting the mirror for which is furnished by the company.

Advertising to the Coming Generation

Publicity that reaches the children makes itself felt in the home. It was the realization of the foregoing



WAITING FOR CONTRACTOR'S STORE TO OPEN, JULY FOURTH

principle that led the Wadleigh & Hockett Electric Company, a comparatively young firm of electrical contractors at Kokomo, Ind., to inaugurate a successful Fourth of July advertising campaign. Dumping a barrel of "electric sparkler" fireworks into their display window accompanied by a notice stating that the sparklers would be free to the boys and girls of Kokomo on July 4, the publicity campaign was started. The store was not opened until 7 a. m. on the Fourth, but at 6:30 a. m. a goodly representation of Kokomo's juvenile population was on hand, as the illustration herewith testifies.

When the store opened there was a concerted rush, and there followed a continuous stream of boys and girls during the greater part of the morning. In spite of the general commotion, however, it should be said to the credit of Kokomo's parents that a remarkable percentage of the youthful celebrators knew the value of courtesy and accepted the contractor's gift with a pleasant "Thank you."

A spirit of childish fairness was generally apparent except in the case of a pickaninny who tried to "repeat" on the generous contractors. His color giving him individuality in the crowd, betrayed him however, and he departed crestfallen at failing in his second attempt, but happy to have retained his first package of sparklers.

Seasonable Advertising on Rented Electric Signs at St. Louis

In addition to selling and renting electric signs, the St. Louis branch of the Federal Sign System (Electric) is handling a complete line of electric specialties. For

A GOOD LOCATION FOR A TIMELY ELECTRIC FAN ADVERTISEMENT

advertising these devices the firm has adopted a novel scheme, using its rented signs as locations for posters advertising the specialties when the signs are not being operated by their lessees.

An illustration herewith shows a large steel sign used in the winter to advertise a theater. In summer, however, when the theater is closed the sign furnishes an excellent location for electric-fan advertising. Although this is the first season the Federal Sign System (Electric) has held the Westinghouse fan agency, reports state that business has been brisk, especially in the retail trade in the southwestern district for which St. Louis is the acknowledged gateway.

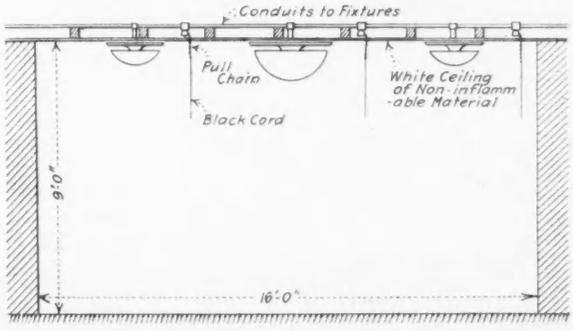
Every Red Tack an Electric Vacuum Cleaner

Handling the sales of Frantz-Premier electric vacuum cleaners in twenty-two Illinois counties the Crawley Electric Company, Peoria, Ill., has recently been enjoying a prosperous season. Orders sent to the factory for 300 and 400 of these appliances at a time, indicate the general trend of the business.

Peoria, as the large city in the territory, is receiving the special attention of salesmen devoting their entire time to cleaner sales. To keep these representatives informed on the general saturation of the devices in various parts of the city, an interesting tally scheme has been worked out. On a map of the city mounted on a pine board measuring about 3 ft. long by 1 ft. wide, red-headed tacks are used to designate the approximate position of each cleaner sold. It was particularly interesting to note the rapidity with which additional tacks appeared in certain residential sections after the first had been placed on the board, showing how effective was the local advertising given by satisfied housewives.

Clear Ceilings for Fixture-Display Rooms

Fixtures, especially those of the indirect and semi-indirect types, should be exhibited in rooms with ceilings free from unsightly wiring and overhanging sockets. The accompanying sketch shows how satisfactory results have been accomplished along this line by Mr. L. B. Van Nuys, of the Central Electric Company, Peoria, Ill. Choosing a room near the rear of the store, measuring about 12 ft. by 16 ft. in plan and 9 ft. high, a ceiling of white asbestos board was installed and all wiring was placed in conduit above the supporting joists. At the fixture leads were taken out of the conduit and run to the lamps, while the conduit itself was extended to support the chain-pull switch, also installed above the ceiling. A neat hole about 0,125 in. in diameter allows a small portion of the chain to hang into the room, and a black cord attached to this chain forms an extension within reach of the salesman demonstrator. The value of this scheme may be said to be twofold, for, in addition to enhancing the beauty of the contractor's salesroom, it gives the prospective customer a better idea of how certain fixtures will look when installed in his residence or place of business.



A CLEAR CEILING FOR FIXTURE DEALER'S DISPLAY

Electrical Contractor Publishes Monthly Newspaper

The publication of a monthly newspaper is somewhat of a departure for an electrical contractor to undertake and it is believed that the Home Electric Construction Company, an Illinois firm, of which Mr. W. I. Savidge is president and general manager, is the first contracting firm to carry on such a feat. The first number of this publication, the heading of which is reproduced herewith, was published in May and was distributed among about 3000 of the prospective customers of the company. With electrical stores and wiring forces in six cities, namely, Macomb, Bushnell, Colchester, Augusta, Rushville, and Lincoln, Ill., the company has quite a field for the circulation of its paper. The first number was distributed over the counters of the company's stores.

"DO IT ELECTRICALLY"

PUBLISHED MONTHLY BY

The Home Electric Construction Co.

OF

MACOMB, BUSHNELL, COLCHESTER, AUGUSTA, RUSHVILLE, LINCOLN

An advance booklet of new electrical ideas and information for every one interested in modern conveniences.

VOL. 1 MAY, 1914 NO. 1

Policies That Create Good Will.

In the publication of this little booklet, it is our utmost desire to bring the customer in closer touch with our company

We all realize that this is the "Show Me" age, for if a salesman

Local Notes

James Boyd of Macomb is having his residence wired.

Leo Cleveland of Bushnell is having his house wired.

Attorneys Elting & Hainline of Macomb have just had the new semi-indirect lighting system installed in

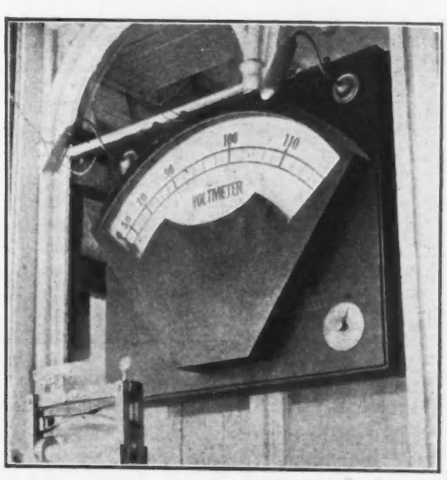
Unique Illumination of Froebie School at Gary, Indiana

The new Froebie school at Gary, Indiana, is a school peculiar to itself. It is upheld as being one of the most modern and efficient, if not the most

HEADING OF MONTHLY NEWSPAPER ISSUED BY ILLINOIS CONTRACTOR

Heroic-Size Instrument for Dealer's Window

A Montreal electrical supply house making a specialty of instrument repairs scored a decided hit this spring by exhibiting in its principal show window the heroic-size voltmeter shown in the accompanying illustration. The case measured some 3 ft. each way and the instrument was designed and built with a pointer, coil and scale calibrated to give correct indications. The scale was also illuminated from the front by a pair of 15-watt tungsten lamps mounted in metal reflectors. The device was frequently cut in circuit and attracted much attention as a supplement to the regular exhibits of washing machines and other electrically operated appliances in the front of the window. The display described was that of the International Electric Company, 97 Bleury Street, Montreal.



HEROIC SIZE VOLTMETER IN MONTREAL CONTRACTOR'S WINDOW

Industrial and Financial News

Public Utility, Commercial, Corporate and Trade Developments—The Electrical Material and Security Markets

Electric Accessories for 1915-Model Automobiles.—The Nordyke & Marmon Company has adopted the Bosch electric lighting and starting system for its 1915-model Marmon cars.

Company's Twenty-fifth Anniversary.—This year there will be celebrated the twenty-fifth anniversary of the founding of the Bristol Company, Waterbury, Conn. During the last twenty years this company has grown steadily, and the floor space of its plant has been increased at a 100-per cent rate for each five years of that time.

Lighting Batteries for Traction Company.—The Puget South Traction, Light & Power Company, Seattle, Wash., recently placed an order with the Electric Storage Battery Company of Philadelphia, for thirty-four "iron-clad exide" batteries of three cells each, which will be used for lighting the cable cars operated by the traction company.

Veneer Mills Operated with Central-Station Energy.—After several months of negotiation with the Louisville Gas & Electric Company and the James J. Clark Company of Louisville, Ky., the Louisville Veneer Mills Company has given an order to the Clark company for motors aggregating 200 hp with which it will begin the electrification of its Louisville mills.

Synchronous Condensers for Winnipeg.—A contract has been awarded to the Canadian Westinghouse Company by the City of Winnipeg for the installation of two 6,000-kva synchronous condensers with necessary transformers. These machines are to be installed at the terminal station of the light and power department for the purpose of improving the power factor of the system. It is expected to increase the capacity of the transmission line about 50 per cent by this means.

Manufacturers of Electrical Accessories Combine.—The Bosch Magneto Company, New York, and the Rushmore Dynamo Works, Plainfield, N. J., have been consolidated, the name of the former company being retained for both concerns. The plant at Plainfield will hereafter be known as the Rushmore works of the Bosch Magneto Company. This plant has a floor area of over 100,000 sq. ft. and employs about 700 men. In the Springfield (Mass.) factory of the Bosch company about 800 men are employed; in the two plants, therefore, close to 1500 men will be at work.

Central Station Service for Flooring Mill.—The Ironton (Ohio) Electric Company has closed a contract with the Yellow Poplar Lumber Company to supply three-phase 440-volt energy for the operation of 600 hp of induction motors used in the lumber company's hardwood flooring mill at Ironton. Direct-current motors were formerly used and energy for their operation was obtained from the lumber company's plant. The motors for the above installation were furnished by the Allis-Chalmers Company and the wiring was done by Erner & Hopkins, Columbus, Ohio.

Large Turbine Set for Brooklyn Edison Company.—The Westinghouse Machine Company has received a contract from the Edison Illuminating Company, Brooklyn, N. Y., for a double-flow turbine-generator with a maximum rating of 25,000 kw, which when completed, it is declared, will be one of the largest single-unit engines of this type ever built. This turbine set is for the Gold Street station and will be completed, it is stated, before Dec. 1. For this unit a radial-flow surface condenser will be used, 16 ft. 4 in. in diameter and 27 ft. long. There are 4500 1.5-in. tubes, 20 ft. 3 in. long in this condenser, giving approximately 35,000 square feet of condensing surface. Two circulating pumps with a rating of 30,000 gal. per minute will be used.

Wireless Stations for China.—Negotiations have been pending between the Chinese Government and the Marconi Wireless Telegraph Company, London, for the erection of a number of wireless-telegraph stations in China. In April the Chinese government sent an official letter agreeing to authorize the Marconi company to issue $10,000,000 of 5 per cent Chinese bonds in payment for the proposed stations. This document was filed at the British Legation in Peking and a formal contract has been sent for approval and signature.

Turbines for the Italian Navy.—A year ago last month the Terry Turbine Company, Hartford, Conn., received an order for nineteen turbines for the Italian navy, the last of which are almost ready for shipment. The first installations proved a success and as a result an order for eight more units was received in May. Now the Terry company is just starting work on twenty-four additional turbines ordered by Messrs. N. Odero & Company, Sestria, Ponente, Italy. The above company is also in receipt of an order for twenty turbines for the new generating station of the Philadelphia Electric Company.

No New Sign Ordinance for St. Louis, Mo.—A lively controversy which has been waged between the city authorities and the electric-sign interests in St. Louis now seems to have reached a definite conclusion for a time at least. St. Louis has been for some time one of those cities where ordinances prevent electric signs extending more than 18 in. over the sidewalk, and now the signs and billboards committee of the Civic League has signified its intention of strenuously fighting any ordinance introduced to extend this limit. Contending that an 18-in. space is insufficient and does not permit of the installation of proper safeguards for large electric signs, the sign men of the city would like to see the limit increased to 3 ft. The committee, however, has feared that such an ordinance would create a precedent which might lead in the future to still greater concessions.

Electric Equipment for Metal-Mining Companies.—The following orders were received by the Westinghouse Electric & Manufacturing Company from metal-mining companies, and tend to show that considerable activity in the metal industries can be expected in the near future: The August Mining Company, Landusky, Mont., three 75-kva transformers, one electrolytic lightning arrester, one complete switchboard equipment, complete line material for a 23,000-volt transmission line, two 4-kva lighting transformers, and twelve motors ranging in rating from 3 hp to 125 hp; the Anaconda Copper Company, Butte, Mont., three 3.5-ton 18-in. gage, 250-volt locomotives and fifteen motors ranging in rating from 7.5 hp to 100 hp; the International Smelting & Refining Company, Miami, Ariz., and Tooele, Utah, one motor-generator set, one switchboard and regulating devices and twenty-eight motors ranging in rating from 3 hp to 150 hp; the Ray Consolidated Copper Company, Hayden, Ariz., sixteen 10-hp motors; the Utah Copper Company, Magna, Utah, seven 10-hp motors; the Daly West Mining Company, Park City, Utah, one 300-hp motor; the Alaska Gastineau Mining Company, Juneau, Alaska, one 6-ton storage-battery locomotive and one 50-kw motor-generator set; the Calumet & Arizona Mining Company, Bisbee, Ariz., two 300-kva transformers and switchboard equipment, and the Empire Mines & Investment Company, Grass Valley, Cal., one 500-hp motor for double-drum hoist and one liquid controller, three 200-kva transformers, one three-phase induction 45-kw regulator and six 35-hp motors.

Street-Lighting Agreement at Montreal.—The city of Montreal has made a new arrangement with the Montreal Light, Heat & Power Company for the lighting of those streets on which underground conduits have been laid. Poles and overhead arc lamps are to be replaced by orna-

mental standards each surmounted by a single magnetite-arc lamp. The agreement with the city is for six years, and the price per lamp is $72.70 per 6.5-amp magnetite arc lamp and $63.15 per 4-amp magnetite arc lamp. Provision is also made for tungsten lighting, the prices being $23 for 80-cp lamps and $16 for 40-cp lamps. The city will supply the lamps, standards and cables, the equipment costing $39,500. According to Mr. A. Parent, superintendent of lighting, this will mean an additional charge of about $20 per lamp.

Central Station Business in the Atlantic States.—In the last issue of the *Electrical World*, publication was made of the first available returns from the central stations for the month of May; and it was shown that, judging by the figures received from a majority of the first fifty cities in the country, the rate of increase for 1914 over 1913, as given by the May totals, was somewhat less than the value shown by April, although considerably better than the low figure established in March. A segregation of the returns from the Atlantic States for May seems to bear out this conclusion, although the actual data as here presented must be accepted with some qualifications. So far as New York state is concerned, the *Electrical World* has received complete returns for March, April and May from fifteen operating companies, the resulting totals being strictly comparable. These are given in Table I; and it will be seen that, while the May rate of increase over 1913 on gross income is somewhat better than the April figure—6.1 per cent against 5.7 per cent—a pronounced falling-off is indicated by the returns for the total energy output of stations, the increase rate of 3.3 per cent as shown by April being changed to a slight decrease for May. It must not be inferred from this that the average company in New York

TABLE I—NEW YORK STATE. COMPARATIVE INCOME AND OUTPUT FOR MARCH, APRIL AND MAY, 1914 AND 1913, FOR FIFTEEN CENTRAL-STATION COMPANIES

	Gross Income from Sale of Energy			Total Energy Output in Kilowatt-hours		
	1914	1913	Per Cent Increase	1914	1913	Per Cent Increase
March	$3,340,208	$3,224,026	3.7	99,858,526	97,484,954	2.5
April	2,227,201	3,057,382	5.7	94,787,843	91,724,287	3.3
May	3,011,830	2,839,691	6.1	87,704,501	87,716,894	*

*Fractional decrease.

state has added nothing to its load in the past twelve months. Actually the average values deduced in these tables are capable of being swayed to a very pronounced degree by the month-to-month returns of three or four of the large companies; and, in the present instance, one of the largest companies in the state certainly sold in May, 1914, a smaller amount of energy for public service than in May, 1913. Amongst all the remaining fourteen companies there is no single instance of any decrease in revenue, and only three examples of diminishing output. As an index to the conditions of the industries in these communities upon which the utilities depend, the basis of energy output is more reliable than the standard of revenue. It must be admitted that several of the smaller utilities, in New York state and elsewhere, are at present experiencing a marked falling-off in the rate of increase. Presumably this is of a temporary character; but in more than one recent instance the operators state that the business slackness is militating very severely against any satisfactory statistical report, that some of their largest industrial consumers are working on reduced time, and that all their new-business efforts are not sufficient to offset the diminished demand which is being placed on the system by some of their larger old-time consumers. It may be of interest to note that the total energy output for the month for all the electric service utilities in the state is probably around 220 million kw-hr. and that the figures for the fifteen companies reporting to the *Electrical World* therefore represent some 40 per cent of the entire central station industry of New York. The returns from New Jersey and Pennsylvania (Table II) show a rate of increase for May somewhat less than for April, and considerably more than for March, on both the revenue and the energy output, the companies reporting to the *Electrical World* in this case constituting some 65 per cent of the entire central station industry of New Jersey and Pennsylvania. In addition to the utilities whose aggregate figures are shown in these

TABLE II—NEW JERSEY AND PENNSYLVANIA. COMPARATIVE INCOME AND OUTPUT FOR MARCH, APRIL AND MAY, 1914 AND 1913, FOR SIX CENTRAL-STATION COMPANIES

	Gross Income from Sale of Energy			Total Energy Output in Kilowatt-hours		
	1914	1913	Per Cent Increase	1914	1913	Per Cent Increase
March	$1,608,389	$1,514,804	6.2	69,848,741	62,874,697	11.0
April	1,662,982	1,463 683	13.7	68,068,344	59,100,154	15.2
May	1,552,136	1,406,102	10.5	66,517,737	58,835,751	13.2

two tables, and who have made comparable reports for the three months, the *Electrical World* has received May statistics from a number of other utilities in the Middle Atlantic belt; and it is found that, for all companies reporting for May, gross income from the sale of energy increased from $4,651,679 in May, 1913, to $4,980,168 in May, 1914, or a rate of 9.5 per cent; while the total energy output increased from 155,905,322 to 162,792,167 kw-hr., or at a rate of 4.3 per cent (Table III). This last value is misleadingly low as an average, owing, as has been mentioned, to the temporary falling off in energy demand upon a single one of the big New York companies. For the whole of the Middle Atlantic central station industry, the energy output of all light and power stations during May, 1914, was probably a little over 300 million kw-hr. Regarding the South Atlantic Division, returns for May indicate general increases in both the revenue and the output throughout the states in that group. Comparable returns for each

TABLE III—MIDDLE ATLANTIC STATES. INCOME AND OUTPUT FOR MARCH, APRIL AND MAY, 1914 AND 1913, OF CENTRAL STATIONS REPRESENTING OVER ONE-HALF OF ENTIRE INDUSTRY OF NEW YORK, NEW JERSEY AND PENNSYLVANIA

	Gross Income from Sale of Energy			Total Energy Output in Kilowatt-hours		
	1914	1913	Per Cent Increase	1914	1913	Per Cent Increase
March (25 companies)	$5,603,720	$5,282,154	6.1	210,843,247	196,343,544	7.5
April (31 companies)	5,769,418	5,257,092	9.8	209,156,581	189,904,240	10.1
May (38 companies)	4,980,168	4,651,679	9.5	162,792,167	155,905,322	4.3

month in the three-month period have been received from only a few companies. All the available figures are given in Table IV, which contains statistics for March, April and May for the three great distributing systems which have their headquarters in Washington, D. C., Baltimore, Md., and Atlanta, Ga. The returns for the three months show a marked degree of uniformity, and indicate that the demand upon the stations is more than 25 per cent greater now than it was a year ago. The rates of increase shown may hardly be regarded as typical for the whole of the South Atlantic territory, at least so far as the smaller communities are concerned. The *Electrical World* reports for May include an additional thirty-four companies in the nine states, most of them operating in cities of 40,000 population and less, and each handling gross monthly sales of between ten thousand and forty thousand dollars. Of these thirty-four companies only two show any decrease in

income for the month as compared with 1913, while five companies report a falling off in energy output. The rate of increase as shown by the combined totals for all the properties may be accepted as the average with some confidence; and it will be seen from Table V that the gross

TABLE IV—SOUTH ATLANTIC STATES. COMPARATIVE INCOME AND OUTPUT FOR MARCH, APRIL AND MAY, 1913 AND 1914, FOR THREE LARGE METROPOLITAN COMPANIES (WASHINGTON, BALTIMORE AND ATLANTA)

	Gross Income from Sale of Energy			Total Energy Output in Kilowatt-hours		
	1914	1913	Per Cent Increase	1914	1913	Per Cent Increase
March	$642,658	$579,850	10.9	33,860,568	25,912,792	30.8
April	604,065	537,670	12.3	32,426,161	24,827,942	30.6
May	574,160	520,981	10.2	32,374,370	25,276,426	28.0

income of these thirty-four utilities increased from $498,160 in May, 1913, to $567,579 in May, 1914, or at a rate of 14 per cent; while energy output increased in the same time from 24,515,240 to 26,189,986 kw-hr., or at a rate of 6.9 per cent. These returns are combined in Table V with the totals for the three large metropolitan systems shown in

TABLE V—SOUTH ATLANTIC STATES. COMPLETE RETURNS RECEIVED BY THE ELECTRICAL WORLD FOR MAY, 1914 AND 1913, FROM THIRTY-SEVEN OPERATING COMPANIES

	Gross Income from Sale of Energy			Total Energy Output in Kilowatt-hours		
	MAY 1914	MAY 1913	Per Cent Increase	MAY 1914	MAY 1913	Per Cent Increase
Three companies shown in Table IV	$574,160	$520,981	10.2	32,374,370	25,276,426	28.0
34 additional companies	567,579	498,160	14.0	26,189,986	24,515,240	6.9
Total for 37 companies	$1,141,739	$1,019,141	12.1	58,564,356	49,791,666	17.7

Table IV. It is seen that for all the South Atlantic companies reporting to the *Electrical World* (aggregating over $1,000,000 a month in income and nearly 60,000,000 kw-hr. in output) there is an increase rate of 12.1 per cent on income and 17.7 per cent on output. On a basis of energy output these companies represent some 60 per cent of the entire lighting and motor service industry of the South Atlantic States.

NEW YORK METAL MARKET PRICES

Copper	July 14 Bid	July 14 Asked	July 21 Bid	July 21 Asked
Standard spot*	13.35	13.75	13.25	13.50
	Selling Prices		Selling Prices	
	£ s d		£ s d	
London, standard spot*	61 0 0		61 10 0	
Prime Lake	13.70	to 13.80	13.65	to 13.75
Electrolytic	13.60	to 13.70	13.50	to 13.60
Casting	13.50	to 13.55	13.35	to 13.45
Copper wire base	15.00	to 15.12½	14.87½	to 15.00
Lead	3.90		3.90	
Nickel	40.00	to 45.00	40.00	to 45.00
Sheet zinc, f.o.b. smelter	7.00		7.00	
Spelter, spot	4.95	to 5.05	4.95	to 5.05
Tin, spot*	31.50	to 32.00	31.60	to 31.75
Aluminum:				
Prompt delivery	17.50	to 17.75	17.50	to 17.75
Future	17.50	to 17.75	17.37½	to 17.62½

*OLD METALS

Heavy copper and wire	12.00	12.25
Brass, heavy	8.25	8.50
Brass, light	7.00	7.25
Lead, heavy	3.60	3.70
Zinc, scrap	3.75	3.85

*COPPER EXPORTS

Total tons to July 21	21,521

*From daily transactions on the New York Metal Exchange.

Corporate and Financial

Los Angeles City Council Acts.—The City Council at a recent meeting authorized the public service committee to ascertain whether the Southern California Company will sell to the city its electrical distributing system, within the city, at a price based on its value to be fixed by the California Railroad Commission.

Semi-Annual Report of Detroit Edison Company.—The semi-annual report of the Detroit Edison Company for the period ended June 30, 1914, shows gross income of $3,155,817, as compared with $2,701,471 for the corresponding period of 1913, and a surplus of $702,745, as compared with $581,552 in 1913. The net income after deducting for operating expenses and reserve funds amounted to $1,800,214, as compared with $1,166,514 for the same period of 1913.

Northern Electric Company, Ltd., Bonds.—Lee, Higginson & Company, New York, are offering the $3,500,000 issue of first-mortgage 5 per cent sinking fund gold bonds of the Northern Electric Company, Ltd., of Montreal, Canada. These bonds, dated June 1, 1914, and due June 1, 1939, are a first mortgage on all of the company's plants and real estate now owned or hereafter acquired. The average annual net earnings for the last five years have been five and a half times the interest charges on these bonds. The company, which is engaged in the manufacture of telephone apparatus and electrical wires and cables, was incorporated in January, 1914, under the laws of Canada as a consolidation of the Northern Electric & Manufacturing Company, Ltd., and the Imperial Wire & Cable Company, Ltd.

American Telephone & Telegraph Company.—With its 53,737 shareholders the American Telephone & Telegraph Company stands third in number of stockholders, being exceeded only by the Pennsylvania Railroad and the United States Steel Corporation. Fifty-three per cent of the total outstanding share capital is owned in a single state. The following were credited April 1, 1914, with 10,000 shares or more: Atlantic & Pacific Telephone & Telegraph Company, 128,279; Bankers' Trust Company, New York, trustee, 55,948; Mr. Joseph J. Slocum, N. Y., 20,400; Mr. Zenas Crane, Dalton, 18,323; Mr. George F. Baker, New York, 16,760; Mr. Frederick Ayer, Lowell, 16,411; Mr. F. C. Welch, trustee, Boston, 13,362; Mr. Winthrop M. Crane, Dalton, 13,000; Guaranty Trust Company, New York, depository, 11,207; Mr. Eugene Higgins, New York, 10,800.

Western Power Company's Dividend Paying Plan.—The directors of the Western Power Company have formulated a plan for the payment of the dividends on preferred stock which shall have accumulated to the amount of 18 per cent from Jan. 1, 1912, to Jan. 1, 1915. It is proposed in the plan to reincorporate the company under the laws of New York, the company now being incorporated under the laws of New Jersey. The new company then, if the plan is ratified, will issue for each 100 shares of old preferred stock 118 shares of the new preferred stock, thus making the dividend payment in preferred stock instead of in cash. At the same time the old common stock, which has a par value of $100, is to be called in and an equal number of shares of new common stock issued, the new common stock to have no nominal or par value. The directors have appointed the following to act as a committee for the carrying out of the plan: Messrs. Irving W. Bonbright, A. W. Burchard, F. Lothrop, A. C. Bedford, M. Fleishhacker and H. P. Wilson.

Cincinnati Gas & Electric Company.—The board of directors of the Cincinnati (Ohio) Gas & Electric Company has issued a reply to the criticisms made in a report at the annual meeting on May 4 by the stockholders protective committee. The reply declares that the stockholders of the company are not concerned over the percentage of income of the lessee so long as its own dividends are paid as agreed. The stockholders of the lessor company have been the persons to benefit to any extent through the lease, the reply states. The board denies that it has refused stockholders access to the books and papers or information regarding the affairs of the company, but says that it did not feel at liberty to enter into correspondence with any

stockholders' protective committee, especially when the committee refused to give the names of the stockholders it claimed to represent. The board also denied that any of the artificial gas houses are in poor condition and practically abandoned, although they are not being used; should occasion arise for their operation, they could be put into condition within a very short time. Capital stock was issued to the lessee company, the board says, in payment of extensions, additions and other improvements made by that company and for which it was to be paid under the terms of the lease. The board had the right to pay for this as it did or to pay at the termination of the lease, as also provided.

Federal Light & Traction Company Expenditures.—The Federal Light & Traction Company will devote $415,000 to extensions and betterments for plants of its subsidiaries from the funds secured recently by the sale of 6 per cent notes. At Trinidad, Col., $110,000 will be used to furnish facilities for supplying the St. Louis, Rocky Mountain & Pacific Coal Company with energy to operate its mines, and $20,000 for street lighting. In the vicinity of Tuscon, Ariz., $100,000 will be expended for power-house extensions, $40,000 for traction company improvements, $10,000 for gas extensions, and $20,000 to extend the high-tension transmission service for irrigation. At Albuquerque, N. M., $15,000 will be expended in accordance with the terms of a new street-lighting contract. The remaining $100,000 is to be expended upon track improvement for the Springfield (Mo.) Traction Company.

American Water Works & Electric Company.—In accordance with the terms of the plan of reorganization, the American Water Works & Electric Company, which was organized under the laws of the State of Virginia, has taken over the assets of the American Water Works & Guarantee Company. The following are to act as the board of directors: Messrs. William Nelson Cromwell, J. B. Finley, H. C. Huffer, Jr., Samuel Insull, H. J. de Lanoy Meijer, James D. Mortimer, Charles H. Payson, Henry H. Pierce, Henry Russell Platt, H. Hobart Porter, Theodore Revillon, W. B. Schiller, Charles R. Scott, Andrew V. Stout, Guy E. Tripp, Robert Wetherell and Albert H. Wiggin. Mr. E. C. Converse, chairman of the reorganization committee, and Mr. Charles R. Brooker, president of the American Brass Company, will act as an advisory committee to the stockholders. The voting trustees are Messrs. William Nelson Cromwell, E. C. Converse, Andrew S. Squire, Albert H. Wiggin and Howland Davis. President H. Hobart Porter in his letter to the stockholders stated that since the properties were acquired as of April 27, 1914, sufficient time had not elapsed to prepare an accurate statement of the company's financial position as of that date. From present indications, however, the company will have originally available about $2,000,000 in cash. Based on the earnings of the water works companies for the year ended April 30, 1914, together with interest on cash and securities in the treasury, it appears that the company's income will be more than sufficient to cover bond interest and dividends on the first preferred stock. In this estimate no income is included from the company's large investment in the West Penn Traction & Water Power Company stock, the payment of dividends by that company having been temporarily suspended in order to strengthen the cash resources. In view of the continued satisfactory earnings of the West Penn company, notwithstanding the depressed industrial conditions, and the further expected increase of earnings resulting from the expenditure for new construction, it may be reasonably assumed that at no distant date and in increasing measure the West Penn securities held by the company will materially add to its income. Many of the subsidiary companies will require the constant and close attention of the directors and officers in order to develop plans under which capital can be secured for maintaining and extending their earning power, while in the case of some of them it may be desirable to carry through a reconstruction so as to establish them on a firmer financial basis. The number of subsidiary companies controlled and the consequent large amount of preliminary work involved in the organization of the company have made it desirable to have the company's financial year date from July 1. The first dividend on the first preferred stock will therefore not be due until Oct. 1 and will cover the period from April 27, 1914.

Business Notes

The Crypto Electrical Company, of London, England, has moved from Bermondsey Street to Acton Lane, Willesden, London.

The Bristol Company, of Waterbury, Conn., has just established a branch office at Boston, Mass., and Mr. F. H. Emerson will be the district manager with headquarters in the Old South Building.

The Union Metal Manufacturing Company, of Canton Ohio, has appointed Mr. C. L. Eshleman, formerly sales manager of the Adams-Bagnall Electric Company, vice-president and general sales manager.

United Electric Stores.—Mr. Max Loewenthal has organized and become president and manager of the United Electric Stores, incorporated to act as distributors of electrical merchandise along the Pacific Coast. The headquarters are at 760 South Hill Street, Los Angeles, Cal.

The Majestic Appliance Company, Inc., of 69 East 89th Street, New York City, was recently organized and will manufacture enclosed flaming arc lamps, 25-cycle inverted arc lamps and photo-engraving lamps. Mr. J. P. Ryan is president of the concern, Mr. A. Rosenberg is vice-president, and Mr. W. Burrows is secretary, treasurer and general manager.

Trade Publications

Dish Washer.—An electric dishwasher is described in a pamphlet distributed by the Electric Dishwasher Company, Buffalo, N. Y.

Wire Reel.—The Wiring Equipment Company, 30 Church Street, New York, has issued a folder describing an expanding-core wire reel.

Switches and Panel Boards—Switches and panel boards are described in catalog No. 6 issued by the Trio Manufacturing Company, Rock Island, Ill.

Crane Equipment.—The Whiting Foundry Equipment Company, Harvey, Ill., has sent out catalog No. 110 relating to cranes for all types of service.

Artificial Meter Loads.—Connections employed with artificial meter loads are described in Circular No. 19, issued by the States Company, Hartford, Conn.

Elevator Safety Equipment.—"Elevator Safety Appliances" is the subject of a pamphlet being distributed by the Safety Appliance Company, St. Louis, Mo.

Milling Machines.—Catalog No. 48, sent out recently by the Newton Machine Tool Works, Philadelphia, Pa., contains information on horizontal milling machines.

Ball Bearings.—Bulletin No. 16 has been issued by the S. K. F. Ball Bearing Company, 50 Church Street, New York, comparing its ball bearings with journal bearings.

Winches and Winding Drums.—Electric winches and winding drums are described in Bulletin No. 48,901 issued by the Sprague Electric Works of the General Electric Company.

Metal Reflectors and Portable Fixtures.—In catalogue No. 311 of the Holophane Works of the General Electric Company metal reflectors and portable fixtures for display cases are described.

Wire, Cable and Accessories.—Information on wire, cable, junction boxes and insulating compounds is contained in a folder put out by the Standard Underground Cable Company, Pittsburgh, Pa.

Cement Gun.—Apparatus for applying cement by means of a hose and nozzle is described in a booklet entitled "The Cement Gun" issued by the Cement Gun Company, Inc., 30 Church Street, New York.

Elevators.—The Otis Elevator Company, Eleventh Avenue and Twenty-sixth Street, New York, has issued several pamphlets pointing out how electric elevators are profitable to central stations.

Lighting, Starting and Ignition Apparatus.—The Bosch Magneto Company, 223 West Forty-sixth Street, New York, announces in a folder that the company is now able to supply lighting, starting and ignition apparatus in quantities.

Heavy-Duty Block and Tackle.—A folder distributed by the Laurent-Cherry Company, Trenton, N. J., contains information on a heavy-duty block and tackle.

Fuse Switches.—The method of installing and removing a high-tension fuse switch is shown in a folder distributed by W. N. Matthews & Brother, St. Louis, Mo.

Electrical Equipment.—Second-hand electrical equipment for sale by Macgovern & Company, 114 Liberty Street, New York, is listed in the firm's recent catalog.

Pumps.—Some actual installations of motor-driven Goulds pumps are described in a booklet sent out by the Goulds Manufacturing Company, Seneca Falls, N. Y.

Heating Appliances.—The Hotpoint Electric Heating Company, Ontario, Cal., has issued a booklet (Form 573) describing tests on two of its heating appliances.

Geared-Type Air Compressors.—Motor-driven geared-type air compressors are described in Bulletin No. 44,591 of the General Electric Company, Schenectady, N. Y.

Expansion Joints.—The Alberger Pump & Condenser Company, 140 Cedar Street, New York, has issued Bulletin No. 19, referring to its expansion joints for pipe lines.

Iron-Clad Switches.—Bulletins No. 27 of the Detroit Fuse & Manufacturing Company, Detroit, Mich., contains information regarding several types of iron-clad switches.

Portable Tools.—Portable tools and applications of flexible shafts are described in catalogue No. 14 prepared by the Stow Manufacturing Company, Binghamton, N. Y.

Charging Storage Batteries.—The Electric Storage Battery Company, Philadelphia, Pa., has published a booklet illustrating graphically the characteristics of its batteries.

Steel Pulleys.—"Transmission Experts at Your Disposal" is the title of a pamphlet on steel split pulleys issued by the Fairbanks Company, Broome and Lafayette Streets, New York.

Meter Seal.—An all-metal seal for meters, etc., is described in a loose-leaf filler issued by the Metropolitan Engineering Company, Forty-second Street Building, New York.

Graphite Products.—The Graphite Metallizing Corporation, Yonkers, N. Y., has issued Bulletins B and E on "Graphalloy" self-lubricating bushings, brushes and contacts.

Fuse Switches.—W. N. Matthews & Brother, St. Louis, Mo., are distributing circular letters and reprints of advertisements from the *Electrical World* referring to their fuse switches.

Pendant Fixtures.—Bulletin No. 1, Vol. 1, issued by the F. W. Wakefield Brass Company, Vermilion, Ohio, contains a description of its Mellowlite fixtures, including reversible bowl units.

Data-Recording Apparatus.—Slocum, Avrum & Slocum, Inc., 30 Church Street, New York, have published a booklet describing applications of a device for recording various data in executives' offices.

Batteries for Signal Work.—Prices of chloride accumulators for operating signals and time clocks are listed in catalogue Section A-1 of the Electric Storage Battery Company, Philadelphia, Pa.

Porcelain and Glass Insulators.—Catalog Section DS-845, issued by the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., contains a price list of high-voltage glass and porcelain insulators.

Small Motors.—Bulletins No. 514, 515, 516, 517 and 518, issued by the Bodine Electric Company, 564 West Randolph Street, Chicago, Ill., contain information on small direct-current and single-phase induction motors.

Motors and Generators.—Bulletins No. 27, 202 and 210 issued by the Fairbanks Morse Electrical Manufacturing Company, Indianapolis, Ind., relate to direct-current motors and generators, constant-speed induction motors and internal-starter motors respectively.

Future of Electrical Industry.—The Pittsburgh Transformer Company, Pittsburgh, Pa., is issuing a pamphlet, No. 1358, entitled "Great Future of the Electrical Industry," which is a reprint of an article published by H. P. Taylor & Company, a well-known New York bond house.

New Industrial Companies

The Lighting Supply Company, of Boston, Mass., has been incorporated with a capital stock of $200,000 by C. S. Eddy, E. W. Powell and F. C. Thomson.

The Fein Electric Tool Company of America, of Boston, Mass., has been chartered with a capital stock of $10,000. The directors are: E. F. Wilmot, president; Walter D. Smith, 7 Wellington Street, Boston, treasurer, and J. L. Gleason.

The Falls Electric Company, of Lima, N. Y., has been incorporated by John D. Falls, Allen L. Methany, Gustav Hirsch and C. F. Metheany. The company is capitalized at $3,000 and proposes to do a general electrical manufacturing business.

The P. & B. Manufacturing Company has been incorporated with a capital stock of $5,000 to manufacture electrical fittings. The general offices are at 306 Manufacturers' Home Building, Milwaukee, Wis. Mr. A. H. Petersen is secretary and treasurer.

The Telephone Toll-O-Meter Sales Company, of Nutley, N. J., has been chartered with a capital stock of $100,000 to manufacture a mechanical device known as "Toll-O-Meter." The incorporators are J. A. Hassell, G. G. Graham and G. W. Mead, of Nutley.

The United States Insulator Company, of Warren, N. Y., has been incorporated with a capital stock of $450,000 to manufacture porcelain insulators and similar products. The incorporators are Michael Livingston, A. B. Livingston, L. L. George and William Newby.

The Kinetic Electric Company, of Norfolk, Va., has been granted a charter with a capital stock of from $200,000 to $500,000, to do a general electric supply business. E. R. Copper, of Baltimore, Md., is president, and W. R. L. Taylor, of Norfolk, Va., secretary.

The Electric Light & Heat Controller Manufacturing Company, of Johnstown, Pa., has been incorporated with a capital stock of $50,000 by P. Lawson, J. E. Zang and H. H. Hoffman, of Johnstown. The company proposes to manufacture automatic damper adjuster.

The Interchangeable Automatic Indicator Company, of Brooklyn, N. Y., has been incorporated by C. Groening, P. Kropp and J. Roth, of Brooklyn, N. Y. The company is capitalized at $50,000 and proposes to manufacture electrical and mechanical appliances for railways.

The Gas Safety Electric Bell Company, of New York, N. Y., has been incorporated with a capital stock of $50,000 by D. J. Guccione, A. and M. Angelo Boua, 52 East 132d Street, New York. The company proposes to manufacture safety apparatus, gas-escape preventive devices, etc.

The Owners' Electric Saving Company, of New York, N. Y., has been incorporated with a capital stock of $5,000 to manufacture meters, electrical devices, etc. The incorporators are J. Lavenberg, 431 Sterling Place, Brooklyn; A. Arnold, of the Bronx, and M. Rodgers, of New York, N. Y.

The Triplex Manufacturing Company, of New York, N. Y., has been incorporated with a capital stock of $10,000 by G. E. Toulopoulous, H. A. Harman and M. L. Chizzola, 47 Forty-second Street, New York. The company proposes to manufacture gas, electric and gasoline saving devices.

The Fargo Manufacturing Company, of Poughkeepsie, N. Y., has been incorporated with a capital stock of $35,000 by A. H. Fargo, of Poughkeepsie; H. L. Mills, of Brookline, Mass., and F. L. Brown, of Wappinger Falls, N. Y. The company proposes to manufacture and deal in electrical and mechanical devices, etc.

The Lassco Auto Signal Lamp Company has filed articles of incorporation under the laws of the State of Delaware. The company is capitalized at $100,000 and proposes to manufacture automobile lamps and lighting devices. The incorporators are: D. J. Shern, L. M. Abeles, Philadelphia, Pa., and J. G. Grey, of Wilmington, Del.

The Electric Vanadium Reduction Company has filed articles of incorporation under the laws of the State of Delaware with a capital stock of $100,000. The company proposes to manufacture machinery for smelting and refining metals and ores. The incorporators are: F. R. Hansell, of Philadelphia, Pa.; G. H. B. Martin and S. C. Seymour, of Camden, N. J.

Personal Mention

Mr. Alfred J. Hixon, of the Hixon Electric Company, Boston, has been appointed national director of the Massachusetts Electrical Contractors' Association.

Mr. J. R. Tomlinson, of the Pierce-Tomlinson Electric Company, Portland, Ore., was recently elected national director of the Oregon Electrical Contractors' Association.

Mr. W. R. Wollaston, of the firm of Wollaston & Walker, contractors, Dayton, Ohio, has been elected president of the Electrical Contractors' Club organized recently in that city.

Mr. J. P. Clark, formerly vice-president and general manager of W. N. Coler & Company's public utility properties, with headquarters at Greensboro, N. C., is absent on a trip to Europe.

Mr. Eugene Lebrun, who has been secretary of the Van Buren (Maine) Light & Power Company, has assumed the additional duties of superintendent as successor to Mr. A. E. Drapeau.

Mr. A. C. Ford has been appointed manager, treasurer and secretary of the Virginia-Western Power Company, Ronceverte, W. Va., formerly the Consolidated Light & Power Company.

Mr. P. P. Craft has resigned as second vice-president and general manager of the Iowa & Illinois Railway Company to become manager of the Mobile (Ala.) Light & Railroad Company.

Mr. Leonard Fitzgerald, formerly manager and superintendent of the Gary (Ind.) Heat, Light & Water Company, now holds the titles of vice-president and manager of that organization.

Mr. Albert H. Stanley, managing director of the London underground tubes and buses, has been knighted by the King of England in recognition of his services to the British government.

Mr. Jesse Rutledge has been appointed manager and superintendent of the Loogootee (Ind.) Electric Light, Power & Water Company, which will commence operation about January, 1915.

Mr. J. D. Murphy, manager and superintendent of the Great Bend (Kan.) Water & Electric Company, now holds the position of vice-president of the company in connection with his other duties.

Mr. Hance Newland has been appointed manager of the Forest City (Iowa) Electric Light & Power Company, relieving President Frank Kellogg, who formerly also performed the duties of that position.

Mr. J. E. Gilmour, who was recently appointed merchandise sales manager of the Northern Electric Company, Ltd., Montreal, Quebec, was formerly head of the service division of the Western Electric Company.

Mr. V. McDaniel has been appointed vice-president and manager of the Harrison (Ark.) Electric Light & Ice Company, succeeding Messrs. W. H. and R. M. Fellows, who formerly held these positions respectively.

Mr. J. S. S. Cooper has resigned as chief engineer to Messrs. Samuel & Company, Ltd., Shanghai, China, and become representative engineer of Messrs. Arnhold, Karberg & Company, with offices at Shanghai.

Mr. L. L. Kellogg, who has been vice-president and manager of the Sioux City (Iowa) Gas & Electric Company, has succeeded Mr. Samuel T. Rodine as president. Mr. Kellogg will continue to hold the position of manager.

Mr. Miles C. Fuller has been appointed manager of the Toulon (Ill.) Light & Power Company, which has been controlled by an executor, Mr. J. H. Wrigley, since the death of V. G. Fuller, its former president and manager.

Mr. Edwin L. Sellars, formerly new-business manager of the Kentucky Public Service Company's system at Bowling Green, has been appointed superintendent of that company at Frankfort, as successor to Mr. A. J. Short.

Mr. Heinrich Beck, of Meiningen, Germany, is visiting the United States to supervise personally the tests at the Brooklyn Navy Yard of his search-lamp with alcohol-cooled electrodes. Mr. Beck was born in Meiningen, Dec. 20, 1878, and was educated in the Technical School at Charlottenburg, Germany. He has made numerous inventions in arc lighting and has worked for many years to develop the search-lamp.

Mr. C. E. Schutt has been appointed supervisor of electric light and power in the new department of public service, Chicago, Ill. Mr. Schutt was graduated from Purdue University, Lafayette, Ind., in 1905 and received the degree of electrical engineer from the same institution in 1911. After acting as instructor in power generation and distribution at Purdue he took up engineering work for the Southern Indiana Power Company at Indianapolis, Ind., in 1913.

Mr. W. D. Uptegraff, who has succeeded Colonel H. G. Prout as president of the Union Switch & Signal Company, Swissvale, Pa., was formerly vice-president of that concern, in addition to serving as director of the Westinghouse Air Brake Company and vice-president of the Westinghouse Machine Company. In 1907 he became financial adviser to the late George Westinghouse, and was appointed on the boards of many concerns in which Mr. Westinghouse was interested. Upon the latter's death, Mr. Uptegraff was appointed an executor of the Westinghouse estate.

Mr. John F. Meany, private secretary to Governor Walsh, of Massachusetts, has been appointed a member of the Public Service Commission, succeeding Hon. George W. Bishop, who resigned last month after eighteen years' service to become chief of the inspection bureau of the board. The new commissioner is thirty-four years of age and has a distinguished legislative record, having also served on the bench in southern Worcester County. He was educated at the Boston University Law School and has been active in Democratic politics in the State, serving as a presidential elector in the last campaign.

Colonel Henry Goslee Prout, who has retired as president of the Union Switch & Signal Company, Swissvale, Pa., has had a very interesting career. During the Civil War he served in the Army of the Potomac. Later he entered the University of Michigan, where he took up civil engineering studies and was graduated in 1871. He received the degrees of master of arts from Yale University and doctor of law from his alma mater. From 1873 to 1878 he served as major of engineers and later as colonel of the general staff in the army of the Khedive of Egypt. He commanded an expedition in the Soudan and also acted as governor of the Provinces of the Equator. After this service Colonel Prout returned to America and became editor of the *Railroad Gazette*, in which position he continued sixteen years. In 1903 he was elected vice-president and general manager of the Union Switch & Signal Company, being promoted to the position of president subsequent to the death of the late George Westinghouse.

Prof. Edward W. Bemis, who was recently appointed by the City of Chicago to serve as the city's representative on the Board of Supervising Engineers, Chicago Traction, succeeding Mr. George Weston, has been acting in an advisory capacity as public-utility expert for the city of Chicago for some time. Last week he was also selected to make a complete inventory and appraisal of the Detroit (Mich.) United Railway Company's property within the one-fare zone. Professor Bemis was born at Springfield, Mass., in 1860 and was educated at Amherst College, where he received the degree of bachelor of arts and master of arts. In 1885 he was given the degree of doctor of philosophy from Johns Hopkins University. For three years commencing with 1889 he was professor of history and economics at Vanderbilt University and was associate professor of political economy for a similar period at the University of Chicago. During 1896 Professor Bemis served as assistant statistician on the Illinois Bureau of Labor Statistics and during the two succeeding years was professor of economic science and history at the Kansas State Agricultural College. Later he acted as director of the Department of Municipal Monopolies, Bureau of Economic Research, New York. Professor Bemis was superintendent of the water department at Cleveland for eight years and deputy commissioner of water supply, gas and electricity at New York in 1910. Since that time he has been acting as special investigator of public utility questions for several cities. Professor Bemis is a member of the National Civic Federation. He is author of works on municipal monopolies and municipal ownership and has also prepared numerous articles on municipal government, trades unions, trusts, monopolies, etc.

Construction

New England

ADAMS, MASS.—The Renfrew Mfg. Co. is erecting a substation in the yard of its main factory in Renfrew to transform electricity to be supplied by the New England Pwr. Co. to operate the mill.

BROCKTON, MASS.—The sewerage commissioners are making investigations with a view to equipping the sewerage pumping with electrically operated machinery.

FITCHBURG, MASS.—The State Board of Gas and Electric Light Commissioners has authorized the Fitchburg Gas & El. Lt. Co. to extend its electrical service to the town of Townsend.

LITTLETON, MASS.—The town has voted to authorize the water and electric light commissioners to extend the electric-lighting system on Great Road to Lake Nagog, provided sufficient patronage can be obtained, and also voted to appropriate $1,800 for construction of same.

NORTH ATTLEBORO, MASS.—Within the next 30 days the Electric Light and Water Department will purchase water tube boilers for the municipal electric-light and water plant. William Plattner is manager.

PITTSFIELD, MASS.—The contract for changing street lamps on West Street, North Street and Park Square has been signed by Mayor P. J. Moore.

PAWTUCKET, R. I.—Plans have been completed for the new plant of the Phillips Insulated Wire Co. in Pawtucket. The power house will be 100 ft. long, 60 ft. wide and about 40 ft. high, and will be equipped with two 600-kw, 550-volt, three-phase, 60-cycle General Electric turbo-generators, Wheeler surface condenser, 2400-hp Manning boilers and General Electric switchboard, etc. The new mill building will be 200 ft. by 200 ft., three stories high with basement.

Middle Atlantic

ADAMS, N. Y.—The Adams El. Lt. Co. has completed arrangements for the installation of an electric-light system in Adams Center.

BROOKLYN, N. Y.—Plans have been filed for the construction of a power house 78 ft. by 122 ft., four stories high, at De-Kalb Avenue, corner of Raymond Street, for the Brooklyn Hospital. Lord, Hewlett & Tallant, 345 Fifth Avenue, New York, are architects.

BUFFALO, N. Y.—The Buffalo General Electric Co. has petitioned the Common Council for authority to acquire the capital stock of the Cataract Pwr. & Conduit Co. and operate the two properties as one plant.

CANANDAIGUA, N. Y.—The City Council is considering the question of building a municipal electric-light plant on the banks of Canandaigua Lake.

CANISTEO, N. Y.—The Hornell El. Co. is contemplating extending its transmission lines to Canisteo to furnish electrical service here. L. T. Mason is superintendent.

CUDDEBACKVILLE, N. Y.—The property of the Orange County Pwr. Co., which furnishes electricity in Cuddebackville, has been purchased by the Port Jervis Lt. & Pwr. Co., of Port Jervis.

FILLMORE, N. Y.—Within the next 12 months the Genesee Valley Pwr. Co., of Fillmore, expects to purchase some transformers and lightning arresters; also standard supplies. H. G. Young is secretary and manager.

NEW YORK, N. Y.—Bids will be received by C. B. J. Snyder, superintendent of school buildings, Department of Education, corner Park Avenue and Fifty-ninth Street, New York, until July 27 for additions and repairs to electric equipment at Public School 106, 253 Lafayette Street; also for additions, alterations and repairs to the electric equipment in Public School 184, 31 West 116th Street, borough of Manhattan.

MEXICO, N. Y.—The capital stock of the Mexico El. Co. has been increased from $5,000 to $50,000.

SYRACUSE, N. Y.—The flaming arc lamps used for illuminating the fair grounds will be replaced with 100 tungsten lamps, to be erected at once. The new lamps will be maintained from the plant to be erected north of the main entrance. Contract for installation of lamps has been awarded to Burns Brothers.

TROY, N. Y.—Plans have been prepared by A. E. Roche, city engineer, for the installation of a new street-lighting system, consisting of 170 curb standards of a design similar to No. 19-J of the Mott Iron Works' standard. It has not yet been decided whether to use luminous arc lamps or the new nitrogen lamps.

WATERLOO, N. Y.—Arrangements have been made whereby the Tracy Development Co. has secured the Seneca hose house No. 4. The company proposes to use the site of the hose house for its electric power plant, work on which, it is understood, will soon begin.

BLOOMSBURG, PA.—Charters have been granted to a number of small electric light, heat and power companies, including several subsidiaries of the Northumberland County Gas & El. Co., of Bloomsburg, as follows: The Turbotville El. Co., the McEwensville El. Co., and the Lewis County El. Co., all in Northumberland County. The companies will furnish electricity in their respective districts. Substations will be erected and electricity secured from the main plant of the Northumberland company at Milton. The Northumberland County Gas & El. Co., which furnishes electricity in Northumberland, Montour and Columbus Counties, has established district headquarters in Bloomsburg.

COATESVILLE, PA.—The Chester Valley El. Co., of Coatesville, has closed a contract for furnishing electricity to a large silk mill in Coatesville; also to operate the pumping station and an ice plant in Parkersburg. Material for these installations has been purchased. F. W. Harris is general manager.

GREENVILLE, PA.—Preparations are being made by the Mercer County Lt., Ht. & Pwr. Co., of Greenville, for the erection of a new power plant, to be located on the south end of the Bessemer Bridge over the Little Shenango River.

MONT ALTO, PA.—The installation of an electric-light plant in Mont Alto is under consideration. It is proposed to utilize the water power at H. M. Small's mill to operate the plant.

NESCOPECK, PA.—The City Council has voted to enter into a contract with the Columbia & Montour El. Co., of Bloomsburg, for lighting the streets of the village, under which the company is to furnish not less than twenty-four 100-watt tungsten lamps.

NEW HOLLAND, PA.—The electric-light plant of the Conestoga El. Lt. Co., which supplies electricity in New Holland, Blue Ball, Earl and East End Townships, has been purchased by the United Gas & El. Corpn., of New York, which controls the Edison El. Co., of Lancaster, for $31,000. Electricity for operating the system will be supplied from the plant in Lancaster, and the local plant will ultimately be abandoned.

PITTSBURGH, PA.—The Pittsburgh Coal Co. has awarded a contract to D. T. Riffle for the construction of two fireproof power houses to be erected at Montour Mines, Nos. 1 and 2, near Venice, Washington County, to cost about $35,000.

RICES LANDING, PA.—The United States Government will build a reinforced concrete power plant at Dam No. 6, to cost about $10,000, for which preliminary plans have been drawn.

SHARON, PA.—The Petroleum Iron Works Co. is erecting an addition (90 ft.) to its power house in Sharon.

SPRING CITY, PA.—Bids will be received by the board of trustees of the Eastern Pennsylvania State Institution for Feeble Minded and Epileptic, Spring City, until July 29 for construction of main and connecting corridors and for heating and plumbing and electric lighting for same, in accordance with plans and specifications prepared by Philip H. Johnson, architect, 1824 Land Title Building, Philadelphia. Plans and blank forms for bids can be obtained at the office of the architect. George W. French is chairman of building committee.

TARENTUM, PA.—The Borough Council has awarded the contract for construction of power house for the municipal electric-light and power plant and water works system to J. W. Welsh, of Pittsburgh. The Council has also granted the Central District Tel. Co. permission to lay underground conduits for its wires under the streets.

WILLIAMSPORT, PA.—A committee has been appointed by the Merchants' Association to look into the matter of improving the lighting system in the business section of the city.

YORK, PA.—The City Council has passed an ordinance granting the Edison El. Lt. & Pwr. Co. and the Merchants El. Lt. & Pwr. Co., both of York, to consolidate.

CAMDEN, N. J.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Aug. 18, for a conduit and wiring system, lighting fixtures, etc., for the United States post office, custom house, etc., at Camden, N. J. For details see proposal columns.

DEAL, N. J.—The property of the New Jersey Wtr. & Lt. Co., of Deal, has been purchased by the Atlantic Coast El. Lt. Co., of Asbury Park. It is understood that improvements will be made to the plant.

HOBOKEN, N. J.—Plans are being considered for the installation of an ornamental street-lighting system on Central Avenue.

JAMESBURG, N. J.—The Jamesburg El. Co. expects to purchase within the next 12 months one 75-kw, 60-cycle, 2200-volt generator. J. W. Pharr is superintendent.

NEWARK, N. J.—The New Jersey Harbor Commission has approved plans of the Public Service El. Lt. Co. for the construction of a power plant, dock and intake and discharge canals on the Passaic River at Point-No-Point, in Newark. The cost of the work is estimated at $100,000 and contract has been awarded to the Linde & Griffith Co., of Newark.

BALTIMORE, MD.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Aug. 11, for installation of air washer, tempering coils, fan, etc., in the United States custom house, Baltimore. For details see proposal columns.

OCEAN CITY, MD.—The installation of a municipal electric-light plant is under consideration. Plans are also being considered for an illuminated board walk 3 miles long.

LOGAN, W. VA.—Plans, it is reported, are being prepared by E. R. Weller, Hibbs Building, Washington, D. C., for construction of power station for the Logan El. Co.

NEWELL, W. VA.—Work has begun on the addition to the plant of the Newell Wtr. & Pwr. Co., which will double the output of the plant (both pumping and electric generating departments). The cost is estimated at $36,000.

WOODSDALE, W. VA.—The Town Council has awarded the Wheeling Valley Lt. & Pwr. Co., of Wheeling, a contract for lighting the streets of the town with electricity. The contract provides for 80-cp lamps to be erected on ornamental posts. Post office address, Wheeling.

FORT DEFIANCE, VA.—Plans, it is reported, have been prepared by the Fort Defiance Milling Co. for the construction of a hydroelectric plant to furnish electricity at Fort Defiance and New Hope, 1½ miles distant. J. S. Norford is manager.

WINCHESTER, VA.—The Northern Virginia Pwr. Co., of Winchester, has filed an application with the Public Service Commission for permission to institute condemnation proceedings to acquire what is known as the old Hopewell or Watson mill property and water rights on the Shenandoah River now owned by D. S. Howell. The company, it is understood, proposes to double the output of its plant.

WASHINGTON, D. C.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until July 31 for furnishing five standards for electric lamps for the United States Bureau of Engraving and Printing, at Washington, in accordance with specification and drawing No. 282A. O. Wenderoth is supervising architect.

WASHINGTON, D. C.—Bids will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until Aug. 4, for furnishing at the various navy yards and naval stations supplies as follows: Brooklyn, N. Y., Schedule 7055—52,500 ft. silk, flexible double conductor, 312,000 ft. 1022-circ. mil bronze, silicon aerial wire, 3200 ft. cotton-covered, rubber-insulated, combustion engines, circuits ignition wire; Schedule 7053—64,500 ft. 2580-circ. mil incandescent lamp cord, 6650 lb. weather-proof wire; 7054—annual supply igniters and spark plugs for same, annual supply spark plugs and extra porcelains for same; Schedule 7025—one 12-kw, 220-volt, interruptless, transformer, X-ray machine. Philadelphia, Pa., Schedule 7031—three motors and three automatic motor starters. Norfolk, Va., Schedule 7024—7250-ft. 30,000-circ. mil single-conductor, stranded wire. Brooklyn, N. Y., Schedule 7044—5200 lb. seamless drawn brass pipe, 12-ft. lengths; Schedule 7031—4960 lb. drawn brass seamless and composition tubes. Charleston, S. C., Schedule 7037—300 lb. 1½ and 2-in. outside diameter brass tubing; Schedule 7044—700 lb. 1-in. outside diameter, composition tubing. Washington, D. C., Schedule 7027—1400 lb. drawn seamless copper tubing. Boston Mass., Schedule 7037—17,400 lb. brass voice tubing; Schedule 7066—rewinding one 300-hp, three-phase, 2300-volt, Westinghouse armature. Bids will also be received until Aug. 18 as follows: Mare Island, Schedule 7035—for 14 water-tight annunciators (types A and B) four contact makers, one 125-volt, water-tight electric whistle outfit, 54 20-volt thermostats (types A-2 and A-8), one transmitter and four angle rudder indicators (water tight), two transmitters and four shaft revolution indicators; Schedule 7032—one 25-kw

direct-current engine driven generating unit. Puget Sound, Wash., Schedule 7032—miscellaneous watt-hour meters; Schedule 7033—7500 lb. 14-in. by 48-in. by .0379-in. hard-rolled sheathing metal. Bids will also be received until Aug. 11 as follows: Brooklyn, N. Y., Schedule 7057—15 12-in., 110-volt, 60-cycle, single-phase, alternating current fans; Schedule 7063—miscellaneous (12 and 16-in. lengths) drawn and seamless steel tubing for steam and water pipes, 3100 lb. hard drawn bar copper (12-in. lengths), 1100 lb. soft sheet copper. Applications for proposals should designate the proposal desired by number.

North Central

DETROIT, MICH.—The contract for the special illumination of Woodward Avenue during the national convention of the Grand Army of the Republic, from Aug. 31 to Sept. 5, has been awarded to William Beck & Sons, of Cincinnati, Ohio.

FARMINGTON, MICH.—The Farmington Lt. & Pwr. Co. has contracted with the Consumers Pwr. Co., of St. Paul, for electrical energy to operate its system. As soon as the transmission lines of the Consumers Pwr. Co. are completed to Farmington the local electric generating plant will be closed down.

HOWELL, MICH.—The municipal electric light and water commissioners have recently purchased a 250-kva Westinghouse generator and a 350-hp Ball engine for the municipal electric-light plant.

JACKSON, MICH.—The City Council has reconsidered its vote awarding a 10-year contract to the Commonwealth Pwr. Co. for lighting the city.

PONTIAC, MICH.—If granted a new contract for street-lighting, the Pontiac Pwr. Co., it is understood, would be willing to install a new street lighting system at a cost of about $10,000. H. B. Wales is manager.

STURGIS, MICH.—The Board of Public Works has awarded contract for 50 lamp standards, of concrete construction, to E. J. Morgan, of Sturgis. The lamps will be maintained by underground wires.

ATHENS, OHIO.—The city of Athens has accepted the proposal of the Central Pwr. Co., which is constructing a large power plant at Floodwood, Ohio, for the purchase of the municipal electric-light plant for $15,000, in consideration of the city granting the company a 25-year franchise to furnish electricity for lamps and motors here. The company will be given a ten-year contract for lighting the streets of the city and also a contract for pumping the city water.

BARBERTON, OHIO.—Application has been made to the City Council by O. C. Barber for a franchise to erect a transmission line and extend the water system from his power plant on the North Center Road and also to lay wires underground through this city.

BLUFFTON, OHIO.—Improvements, involving an expenditure of $20,000, are contemplated to the municipal electric-light plant and water works systems.

CANTON, OHIO.—The City Council is considering taking action on the recommendation of the Council Committee, requiring all overhead wires in the downtown section of Tuscarawas Street to be placed underground, and the installation of combination trolley and electric light poles at the curb line for the combined use of the railway and lighting companies.

CINCINNATI, OHIO.—Bids will be received until July 30 by Elxner & Anderson, architects, Cincinnati, for construction of a new building, including electrical and other work, at the Longview Hospital, near Cincinnati.

CINCINNATI, OHIO.—Bids will be received by the new court house building commission of Hamilton County, Cincinnati, Ohio, until Sept. 1, 1914, for construction, including general construction, heating and ventilating, electrical work, elevator equipment and a power plant, of the new court house and county jail in Cincinnati, in accordance with plans and specifications prepared by Rankin, Kellogg & Crane, architects, 1012 Walnut Street, Philadelphia, Pa. Copies of plans and specifications, etc., are on file in the office of the architects.

CLEVELAND, OHIO.—Plans have been prepared for a building and bids accepted for a fireproof power plant at Scranton Road Hospital, to cost about $90,000. Equipment for plant, it is understood, will soon be purchased.

CLEVELAND, OHIO.—The Parish & Bingham Co., of Cleveland, manufacturer of automobile frames, it is reported, is contemplating the construction of a power house, to adjoin the new factory building at Madison Avenue and West 116th Street. Switchboard and other apparatus will be purchased, but the company will secure electricity for several months from the Cleveland Illg. Co. Later it will install generating equipment and other machinery necessary to supply energy to operate its plant.

COLUMBUS, OHIO.—Investigations are being made under the direction of State Superintendent of Public Works John I. Miller of the possibility of establishing hydroelectric plants on the Maumee River and the chain of lakes in Summit County.

DAYTON, OHIO.—The new building under construction by the Dayton Engineering & Laboratories Co., manufacturers of Delco ignition systems, will require a large amount of wiring and other electrical equipment.

DE GRAFF, OHIO.—Bonds to the amount of $7,500 have been issued for improvements to the municipal electric-light plant.

IRONTON, OHIO.—The Ironton El. Lt. Co. is contemplating extending its transmission lines to the village of Coal Grove to furnish electrical service there.

LANCASTER, OHIO. — The Lancaster Trac. & Pwr. Co. has accepted the renewal of the old franchises and also the new one granted by the City Council. The new franchise calls for the construction of a street railway on several streets of the city, to be completed by Jan. 1, 1917.

LORAIN, OHIO.—The Board of Education has decided to install an electric generating plant to furnish electricity in the high school and in the Charleston School building. Orders have been placed for an engine generator, to cost $1,800.

MILLERSBURG, OHIO.—The Citizens' Lt. & Pwr. Co., recently incorporated, is reported to be contemplating the installation of an electric plant to furnish electricity for domestic and industrial purposes. The company is capitalized at $35,000. R. E. Dreyer, W. L. Koch, F. E. Kavanaugh and others are interested in the company.

NORWOOD, OHIO.—Bids will be received until Aug. 7 for rebuilding the electric-light plant and water-works system in Norwood. Among the electrical equipment required will be a switchboard and two generators. Walter G. Franz is consulting engineer.

PAINESVILLE, OHIO.—Bids will be received by the city of Painesville, until July 28, as follows: (1) For furnishing material and installing an ornamental lighting system in the business district; (2) furnishing 100 40-watt multiple lamps, 500 street series lamps of 60 cp, 150 street series nitrogen filled lamps of 400 cp, 42 street series nitrogen filled lamps of 600 cp; (3) for furnishing all electric meters needed for the Electric Light Department for one year from Aug. 1, 1914, as follows: approximately 300 5-amp, 60-cycles, 110-volts, together with prices on all other sizes; (4) for furnishing all transformers for the department for one year beginning Aug. 1, 1914, approximately as follows: 10 3-kw, 10 5-kw, and 4 7½-kw, together with prices on all other sizes of transformers. Bidding blanks and plans may be obtained upon application to O. W. Kile, secretary of electric light department.

ST. PARIS, OHIO.—The city of St. Paris is now installing 18 ornamental lamp standards carrying five-lamp clusters, maintained by underground wires, one-half of the cost to be paid by the business men and the remainder by the city. J. C. Phelps is superintendent of municipal electric plant.

URBANA, OHIO.—The contract for building a new addition to the power house at the University of Illinois has been awarded to Freeman & Brooks, of Champaign, to cost $44,800. Equipment for the new plant will consist of two 500-hp Babcock & Wilcox water tube boilers, fitted with Greene stokers.

WEST MILTON, OHIO.—L. A. Pierson, proprietor of the local electric-light plant, has recently purchased material for the erection of about 5 miles of distribution lines.

WOOSTER, OHIO.—The Wooster El. Co. expects to purchase within the next 12 months considerable material for distribution and lighting systems; also electrical appliances and supplies. Charles V. Hard is president.

YOUNGSTOWN, OHIO.—The Mahoning County Lt. Co., of Youngstown, has applied to the Ohio Public Utilities Commission for permission to issue $400,000 in capital stock and $600,000 in bonds, the proceeds to be used to purchase property of the Youngstown Htg. Co., and for improvements and extensions to same.

YOUNGSTOWN, OHIO.—Complete plans for power plant and underground feed system for the Mahoning County Lt. Co., to cost approximately $1,000,000, of Youngstown, have been prepared by the Westinghouse, Church, Kerr & Co., of New York, N. Y. If favorable action is taken by the Ohio Utilities Commission upon the application of the company to issue $1,000,000 in stock and bonds, work will begin immediately. Harry Engle is secretary.

CADIZ, KY.—The Cadiz Lt. & Pwr. Co. is reported to be negotiating with E. W. Frye, of Memphis, Tenn., for equipment for its power plant.

GEORGETOWN, KY.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Aug. 12 for construction complete, including mechanical equipment, interior lighting fixtures and approaches, of the United States post office at Georgetown, Ky. Drawings and specifications may be obtained at the above office or from the custodian of site at Georgetown.

HENDERSON, KY.—The municipal electric-light plant was damaged by a cyclone on July 16.

WARSAW, KY.—The City Council is considering a proposition submitted by Lawrenceburg parties asking for a franchise to furnish electrical service in Warsaw, including street-lighting.

KNOX, IND.—The Knox El. Lt. & Pwr. Co. has contracted with the Plymouth El. Lt. & Pwr. Co., of Plymouth, for energy to operate its system. The Plymouth company will erect the transmission line to the corporation line of Knox, and from there the Knox company will build the line to the local plant, a distance of about ½ mile. Material and equipment have already been purchased. Thomas A. Grist is proprietor.

WATERLOO, IND.—The Town Council is negotiating with the Indiana Utilities Co. for installation of a new street-lighting system throughout the town. It is proposed to install ornamental lamps in the business district and 60-cp. tungsten lamps on other streets.

CARTHAGE, ILL.—The City Council has awarded the Central Illinois Pub. Ser. Co. a renewal of the street-lighting contract for a period of ten years. The company agrees to make changes in its equipment, involving an expenditure of about $7,000, and also proposes to remove the poles from the square and Main Street and place them in alleys.

CHICAGO, ILL.—Bids will be received by John McGillen, clerk of the Sanitary District of Chicago, Room 700, 910 South Michigan Avenue, Chicago, Ill., until July 30 for furnishing and installing electric equipment and steam and water piping for a 4000-kw turbine unit, in the Thirty-ninth Street pumping station; for construction of a concrete block annex to the terminal station at Thirty-first Street and Western Avenue; furnishing and installing electric equipment in the terminal station annex; for furnishing and delivering power transformers and four-duct insulated lead-covered cable. For details see proposal columns.

JACKSONVILLE, ILL.—The residents on East and West State Street are contemplating the installation of an ornamental lighting system.

KANKAKEE, ILL.—Steps have been taken to organize a company to be known as the Illinois Lt. & Pwr. Co., in Kankakee, for the purpose of constructing a dam and power plant at what is known as the "Palisades," a few miles down the river from Kankakee, to supply electricity in near-by cities. A. N. Powers is interested in the project.

KILBOURNE, ILL.—The installation of a street-lighting system in Kilbourne is reported to be under consideration.

MATTOON, ILL.—The Central Illinois Pub. Ser. Co., of Mattoon, has applied to the Public Service Commission for permission to erect and operate a high-tension transmission line from a point opposite Beardstown to Frederick, Browning and Sheldon's Grove, and there connecting with the company's existing line; also for permission to operate a distribution system in and through the hamlet of Aetna, and also to erect a transmission line from Taylorsville to connect with the existing line.

SPRINGFIELD, ILL.—The contract for the installation of an ornamental lighting system on Adams Street, between Lewis and Tenth Streets, has been awarded to Ratchford Brothers, of Springfield, at $7,286.

SPRINGFIELD, ILL.—The City Council has awarded the contract for new generator to be installed at the water works to the Westinghouse El. & Mfg. Co., at $18,650. It is proposed to combine the water and lighting plants.

SPRINGFIELD, ILL.—The Springfield Gas & El. Co. has applied to the Public Service Commission for authority to erect

and operate a transmission line from Springfield to the Tuxhorn Mine, a distance of about 3 miles.

SPRINGFIELD, ILL. — The construction of a large electric plant on the outskirts of Springfield to furnish electricity to adjoining cities, is reported to be under consideration by eastern capitalists. F. E. McCarthy, of New York, N. Y., is interested.

SULLIVAN, ILL.—A special election will be held July 28 to submit the proposal to issue $35,000 in bonds, of which the proceeds of $20,000 will be used for improvements to the water works system and $15,000 for the municipal electric-light plant.

WAUKEGAN, ILL.—The committee appointed to investigate different street lighting systems has recommended the installation of ornamental standards carrying five-lamp clusters on Genesee and Washington Streets.

WHITEHALL, ILL.—The City Council is considering the question of installing a municipal electric-light plant in Whitehall.

WINNEBAGO, ILL.—A movement has been started to secure the installation of an electric-lighting system here. C. W. Mellen is interested in the project.

BUTTERNUT, WIS.—Bids will be received by Charles F. Graf, secretary, until Aug. 1, for consideration of a combined grade and union free high school building at Butternut. Separate bids will be received at the same time for plumbing, heating and electric wiring. Henry Wildhagen, of Ashland, is architect.

DORCHESTER, WIS.—The Wells El. Construction Co., it is reported, is interested in a project to install an electric-light plant in Dorchester.

FON DU LAC, WIS.—The Eastern Wisconsin Ry. & Lt. Co., of Fond du Lac, it is reported, is contemplating extending its system into the eastern and western sections of the city. J. P. Pulliam is general manager.

MENESHA, WIS.—The City Council is considering replacing the present arc-lamp street lighting system with incandescent lamps.

MILWAUKEE, WIS.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Aug. 14 for construction, complete, including plumbing, gas piping, heating apparatus, electric conduits and wiring, interior lighting fixtures and approaches, of the United States Appraiser's stores at Milwaukee, Wis. Drawings and specifications may be obtained from the above office or from the custodian of site at Milwaukee, Wis. O. Wenderoth is supervising architect.

TOMAHAWK, WIS.—The Tomahawk Lt., Tel. & Improvement Co. is changing its plant from 133 cycles to 60 cycles. All machinery has been contracted for.

VIROQUA, WIS.—The installation of an electric-light plant in Viroqua is under consideration. Edwin M. Tainter is reported interested.

CEYLON, MINN.—The citizens have voted to install an electric-lighting system in Ceylon and to extend the water service.

CLARA CITY, MINN.—The Montevideo Lt. & Pwr. Co., of Montevideo, is installing an electric-lighting system in Clara City; electricity for maintaining same will be supplied from the company plant in Montevideo and at Minnesota Falls. All overhead line material has been contracted for. The company will purchase some meters. E. A. Aspens, secretary and manager, has charge of the work.

EVELETH, MINN.—The City Council has offered the Home El. & Htg. Co. of Eveleth, $130,000 for its property. The municipality proposes to take over the plant and operate the same.

ELYSIAN, MINN.—The Village Council has awarded the Consumers Pwr. Co. of Minnesota (Faribault division) contracts for lighting the streets of the village and for operating the pumping station. The company was recently granted a franchise in Elysian and will begin work on construction of the local distribution system.

NORTHFIELD, MINN.—The installation of an electric fire alarm system in Northfield is reported to be under consideration.

AURELIA, IA.—A petition has been presented to the City Council asking that a special election be held to vote on the proposal to install an electric-light plant. Two plans are reported to be under consideration, one to establish a municipal plant, the other to secure electricity from the plant at Cherokee.

CHARLES CITY, IA.—The Cedar Valley Pwr. Co., successor to the Charles City Htg. & Ltg. Co. has been granted permission to issue $500,000 in bonds. The company proposes to purchase heating, lighting, power and street car systems in several surrounding towns. A. L. Dodd, of Charles City, is secretary and general manager.

CLINTON, IA.—Plans, it is reported, have been completed for the installation of an ornamental lighting system on Lyons Boulevard.

HOLSTEIN, IA.—Preparations are being made by the Holstein Service Co. for the installation of an electric-light plant, the equipment to include a 100-hp Mietz & Weiss oil engine directly connected to a Western Electric generator and exciter (already purchased). Work will begin about Aug. 15. Joseph K. Trauerman, manager, has charge of the work.

IOWA FALLS, IA.—The Iowa Ry. & Lt. Co., of Cedar Rapids, is negotiating for a site for the new power plant it proposes to build in Iowa Falls. The company was recently granted a franchise.

KEOKUK, IA.—Bids will be received by G. Walter Barr, secretary board of education, Keokuk, until Aug. 1 for the construction of the Garfield School House in the Independent district of the city as follows: (A) for heating and ventilating; (B) plumbing; (C) electrical work; (D) general construction of building, exclusive of the above. Separate bids must be submitted for each division. Plans and specifications are on file in the office of H. E. Ratcliffe, architect, Keokuk.

MEADVILLE, MO.—The installation of a municipal electric-light plant in Meadville is under consideration.

PATTONSBURG, MO.—A franchise is reported to have been granted to O. L. Wright and G. E. Weaver to install and operate an electric-light plant in Pattonsburg.

ST. LOUIS, MO.—Arrangements have been completed by the Franklin Avenue Improvement Association for improvements to the lighting system on Franklin Avenue, between Fourth Street and High Street.

ST. LOUIS, MO.—Plans are being prepared by the Union El. Lt. & Pwr. Co., of St. Louis, it is reported, for the construction of two large buildings on its property on Charles Street, between Ninth and Tenth Streets, with a substation between. The total cost is estimated at $1,500,000. A. C. Einstein is vice-president and general manager.

BLAIR, NEB.—The Council is considering the question of submitting the proposal to issue bonds for a municipal electric-light plant to the voters.

ARMA, KAN.—The city of Arma is now constructing an electric-light plant and water works system. All equipment has been purchased. A. C. Moore, of Joplin, Mo. is engineer in charge.

GARNETT, KAN.—Bids will be received by F. S. Mitchell, city Clerk, until July 30 for furnishing material and construction of municipal electric-light plant and distribution system as follows: For one 150-hp Corliss engine, one 100-kw, alternating-current generator, switchboard, etc., one 150-hp return tubular boiler; material for distribution system, including transformers, street lamps, etc., and construction of power house. Plans and specifications are on file in the office of the city clerk, and copies can be obtained at the office of Worley & Black, consulting engineers, Reliance Building, Kansas City, Mo.

HOISINGTON, KAN.—Plans are being prepared by the Hoisington El. & Ice Co. for the installation of an ornamental street-lighting system. The present plans provide for 24 standards carrying three-lamp clusters, maintained by underground wires, to cost about $1,500. J. R. Murphy is manager.

MINERAL, KAN.—The Empire District El. Co., of Joplin, Mo., it is reported, is contemplating erecting a transmission line from its substation in Scammon to Mineral, to furnish energy to the mines to be opened here.

PITTSBURG, KAN.—The contract for the poles for the ornamental lighting system (combined trolley pole type) has been awarded to the United Iron Works Co., of Pittsburg. The plans provide for the installation of 173 100-watt and 519 60-watt, type C, Mazda lamps, maintained by overhead wires. The cost of the system is estimated at $13,000. L. E. Curfman, city engineer, will have charge of the work.

SALINA, KAN.—Improvements are being made to the electric and gas plants of the Salina Lt., Pwr. & Gas Co., which will include the installation of a new rotary converter to furnish power for street railway service.

TOPEKA, KAN.—The electrical equipment in the Auditorium, it is reported, has been condemned, and will be replaced. E. J. Stewart is electrical inspector.

Southern States

KINSTON, N. C.—The City Council has engaged Gilbert C. White, of Charlotte, consulting engineer, to take charge of work on improvements to the municipal electric-light plant, sewer system and paving, for which $100,000 in bonds were recently voted.

MORAVIAN FALLS, N. C.—Plans are being considered by the Moravian Falls Milling & Pwr. Co. for the construction of a dam 35 ft., to replace the present wooden dam. J. T. Humphries is manager.

FLORENCE, S. C.—Preparations are being made by the Florence El. & Utility Co. to install new equipment to double the output of its plant.

WALHALLA, S. C.—Preparations are being made for the installation of a municipal electric-lighting system, for which $6,000 in bonds have recently been voted. Electricity for operating the system will be obtained from the Walhalla Lt. & Pwr. Co. W. M. Brown is Mayor.

WALTERBORO, S. C.—The installation of an electric-lighting system in Walterboro is under consideration.

CONYERS, GA.—The Panola Lt. & Pwr. Co., of Conyers, is contemplating increasing the output of its hydroelectric plant by 500 hp and transmitting electricity to Lithonia, a distance of 30 miles.

GAINESVILLE, GA.—Contract has been awarded by the Southern Ry. Co. to Porter & Boyd, Charlotte, N. C., for construction of substations at Gainesville and Howell, in connection with the installation of automatic electric block signals between Gainesville, Atlanta and Austell. B. Herman, of Washington, D. C., is chief engineer.

ROCKMART, GA.—At an election to be held Aug. 6 the proposal to issue $5,000 in bonds for extension to the municipal electric-light plant will be submitted to the voters.

VALDOSTA, GA.—The City Council is considering the question of installing a municipal electric-lighting system. W. D. Peeples of the fire and light committee has been authorized to make investigations.

FORT MEADE, FLA.—The City Council is considering the question of calling an election to vote on the proposal to issue bonds to purchase the local electric-light plant.

ZEPHYRHILLS, FLA.—The installation of an ice plant in connection with its electric plant is contemplated by the Zephyrhills El. Co.

MORRISTOWN, TENN.—The Southern Ry. Co. has awarded the contract for construction of substation in Morristown to L. C. Powers, of Knoxville. The station will furnish electricity for operating the automatic block signals between Morristown and Knoxville.

BIRMINGHAM, ALA.—The Yolande Coal & Coke Co. has contracted with the Alabama Pwr. Co. to furnish electricity to operate its mines at Yolande and Abernant, beginning next October. Right of way is now being secured for the transmission line.

FALLS CITY, ALA.—D. W. Day, of Hartsells, it is reported, is contemplating the construction of a hydroelectric power plant with transmission line to Jasper, 12 miles long. Present plans provide for two generating units, one of 200 hp and the other of 300 hp.

RIPLEY, MISS.—A franchise to establish an electric-light plant in Ripley, it is reported, has been granted by the city.

TUPELO, MISS.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Aug. 26 for the construction complete, including mechanical equipment, lighting fixtures and approaches, of the United States post office at Tupelo, Miss. Drawings and specifications may be obtained from the above office or from the custodian of site. O. Wenderoth is supervising architect.

BILLINGS, OKLA.—Bonds to the amount of $7,000 have been voted for the installation of a municipal electric-light plant in Billings.

BLACKWELL, OKLA.—The Council, it is reported, will submit the proposal to issue bonds for a municipal electric-light plant to the voters.

DURANT, OKLA.—The City Council has entered into a contract with the Durant Ice & Lt. Co. for electricity to operate the municipal electric-lighting system and the pumping station for a period of six years. The municipal generating plant will be closed down.

DALLAS, TEX.—Contracts for installing electric-lighting fixtures and fans in the new municipal building has been awarded to the Egan Fixture Co., of Dallas, at $6,459.

MEXIA, TEX.—The Mexia Wtr., Lt. & Pwr. Co., recently organized, will make extensions and improvements to the electric-light plant, at a cost of about $25,000. Contracts have been awarded for new power house and additional machinery. The present plans provide for doubling the output of the plant. O. H. Brannon is general manager.

TAFT, TEX.—The Taft Oil & Gin Co. will erect a new ten-stand gin plant at Taft, which will be an addition to the one now operated by the company. Contracts for machinery for gin and power plants have been placed. The plant recently destroyed by fire was located at Sinton and will not be rebuilt this year. R. F. Isbell is manager.

WACO, TEX.—The installation of an ornamental lighting system in the business district is under consideration.

Pacific States

KALAMA, WASH.—Bids will be received by H. A. Pryde, town clerk, Kalama, until Aug. 1, for furnishing electricity to the town of Kalama to maintain approximately 1000 incandescent lamps and 23 arc lamps and for such additional power as may be needed. A continuous service will be required. Proposals to be submitted upon five and ten year contracts, respectively.

REPUBLIC, WASH.—The County Commissioners have granted a franchise to Mahlon McCain and Frank Shields to erect transmission lines on all roads in Ferry County. Lee F. Austin, of the Austin-McCain Co., states that his company will build a high-tension transmission line, work on which will start within 60 days. At Danville, 30 miles from Republic, the lines will connect with the transmission line from Bennington Falls, B. C., owned by the West Kootenai Pwr. & Lt. Co., from which energy will be obtained to supply the Republic district.

SEATTLE, WASH.—Bids will be received by Major J. B. Cavanaugh, United States Engineer Office, Burke Building, Seattle, Wash., until Aug. 10 for furnishing and installing electrical equipment and operating machinery in the locks of the Lake Washington Government Canal in Seattle. The cost of the equipment and work is estimated at about $150,000. The original bids were recently rejected, the government considering them too high.

ASTORIA, ORE.—The Pacific Pwr. & Lt. Co., of Portland, expects to erect within the next 30 days 1 mile of 22,500-volt transmission line to supply energy to the Tacoma Dredging Co., for dredging for the new municipal dock. The Hammond Lumber Co., from which the Pacific company secures all energy has purchased a 1000-kw General Electric turbine. J. B. Kilmore is manager.

DRAIN, ORE.—The City Council has decided to sell $6,000 in bonds to provide funds to install an electric-lighting system. Electricity to maintain the plant will be obtained from the Douglas County Lt. & Wtr. Co., of Roseburg, which will extend its transmission line from Winchester to Drain.

EUGENE, ORE.—L. C. Gilman, president of the Oregon El. Co., recently announced that as soon as water rights on Clear Lake, 75 miles east of Eugene, are granted by the State of Oregon and the United States Government, work on the construction of a $5,000,000 power plant will be started. The company proposes to construct power plants capable of developing 90,000 hp (combined) at the base of the Cascade Mountains, water to be carried from Clear Lake to the plants through a large canal. Preliminary surveys have been made.

GLENDALE, ORE.—The Oregon-California El. Co., which recently purchased the local plant, contemplates extending its transmission lines from Glendale to Riddle, a distance of 20 miles.

PORTLAND, ORE.—The Pacific Pwr. & Lt. Co., of Portland, is erecting about 15 miles of 66,000-volt transmission line to connect an isolated plant in Pomeroy, Wash., to its high-tension system that now ends at Dayton, Wash.

PORTLAND, ORE.—The Portland Ry., Lt. & Pwr. Co. expects to erect within the next three months 8 miles of 60,000-volt transmission lines and to make regular extensions to its distribution lines. O. B. Coldwell is general superintendent of light and power department.

SALEM, ORE.—The application of George W. Holcomb, of Portland, to appropriate 1500 ft. of water per second from the Clackamas River for the development of 10,225 hp. has been approved by State Engineer Lewis. The company which Mr. Holcomb represents, it is reported, proposes to construct a power plant, to cost about $1,000,000, work to begin this season. Plans provide for an 80-ft. dam.

SANDY, ORE.—The City Council has granted the Portland Ry., Lt. & Pwr. Co. a franchise to furnish electricity here. The company will erect a transmission line from the Bull Run plant to Sandy.

ALAMEDA, CAL.—Bids will be received until July 28 for an exciter generator (directly connected) for the municipal electric-light plant. Specifications are on file in the office of A. D. Goldsworth, secretary, City Hall, Alameda.

EUREKA, CAL.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until August 25 for an oil-burning plant for heating boiler in the United States post office and custom house at Eureka, Cal. For details see proposal columns.

FRESNO, CAL.—The contract for the installation of the electrolier system in the business district has been awarded to the NePage-McKinney Construction Co., of Seattle, Wash., at $45,600. The plans provide for 483 standards carrying five-lamp clusters.

GREENVILLE, CAL.—The State Railroad Commission has authorized the Round Valley R. R. Co., of Greenville, to lease its property to the Plumas Lt. & Pwr. Co., of Greenville, formerly known as the Indian Valley El. Lt. & Pwr. Co. The commission has also authorized the Plumas Lt. & Pwr. Co. to lease a portion of its property to Clara Bidwell. These two leases are part of a transaction by which water stored in the Round Valley Water Co.'s reservoir is to be used for developing hydroelectric power.

HOLTVILLE, CAL.—The Holton Pwr. Co., of Holtville, has applied to the State Railroad Commission for permission to issue $200,000 in bonds, the proceeds to be used for extensions to its generating and transmissions systems.

SALT LAKE CITY, UTAH.—The Capitol Commission has awarded the contract for furnishing lighting fixtures for the State Capitol building to Mitchell, Vance & Co., of New York, N. Y., for $25,000.

PRESCOTT, ARIZ.—Surveys are being made of the Bridal Veil, Mooney, Navajo, Supai and Beaver falls in Cataract Canyon, with a view of developing the water power to generate electricity. It is estimated that 7000 hp can be developed. W. J. Johnson, of Prescott is interested in the project.

CARSON CITY, NEV.—The Secretary of the Interior has authorized the Reclamation Service to award contract to the Canyon Pwr. Co., of Oakland, Cal., for the lease of the electric power plant, substation and transmission line of the Truckee-Carson irrigation project, Nevada, subject to the sales of power already made, for a term of ten years, beginning Sept. 1, 1914.

ALBUQUERQUE, N. M.—Plans have been completed for the installation of a new street-lighting system (to replace the present arc lamps), which provide for 115 type C, nitrogen lamps of 200 cp, 28 ornamental brackets carrying four-lamp clusters (40-watt tungsten lamps) and 24 ornamental standards carrying one 80-cp, type C, Mazda lamp. Orders for equipment have been placed. The company will do the installation work. A. F. Van Deinse is manager.

LAS CRUCES, N. M.—The Las Cruces El. Lt. & Ice Co. expects soon to purchase a Deisel-type crude oil engine, probably directly connected to a 150-kva, 2300-volt generator. D. W. Morgan is manager.

Canada

EDMONTON, ALTA.—Plans are being considered by the officials of the Edmonton Interurban Street Railway for equipping the railway to St. Albert for electrical operation. Bion J. Arnold, of Chicago, Ill., is consulting engineer.

NELSON, B. C.—The Canadian government has announced its intention of erecting a telephone line along the west side of Kootenay Lake, from Pilot Bay to Kootenay Landing; also to build a telephone line from Nelson to Waneta, a distance of 60 miles. Appropriations have been made for the work.

THE PAS, MAN.—Tenders will be received by H. H. Elliott, M. D., secretary and treasurer of the town of The Pas, until Aug. 11, for furnishing machinery and equipment as follows: (A) two sewage lift pumps; (B) electric house meters; (C) for construction of sewage lift chamber and oil tank chamber. Plans and specifications may be seen at the office of Murphy & Underwood, consulting engineers, Saskatoon, Sask., and at the office of the resident engineer, The Pas. A complete set of plans and specifications may be obtained upon deposit of $25, and a set covering all contracts on a deposit of $50.

IROQUOIS, ONT.—Tenders will be received until July 29 for improvements to the municipal electric-light plant, plans and specifications for which may be obtained at the office of Allen McInnis, town clerk, Iroquois.

KINCARDINE, ONT.—The by-law providing for the installation of an incandescent street-lighting system has been approved by the ratepayers.

MONTREAL, QUE.—The Montreal Arena Co. is contemplating the installation of an artificial ice manufacturing plant to be equipped with electrically operated machinery. J. Bennett, of Montreal, is designing the electrical equipment.

OTTAWA, ONT.—Tenders will be received by R. C. Desrochers, secretary of the Department of Public Works, Ottawa, for construction of steel gates, towers and operating machinery for the regulating dam, Big Chaudiere Falls, French River, Ontario. Plans and form of contract can be seen and form of tender obtained at the Department of Public Works, and at the offices of the district engineers, Confederation Life Building, Toronto, Ont., and Shaughnessy Building, Montreal, Que.

ST. CATHERINES, ONT.—An estimate for an ornamental street-lighting system covering a number of streets has been submitted to the Council by J. S. Campbell, chairman of the St. Catherines Civic Hydro-Electric Commission, which provides for 105 single lamp standards mounted with 1000-cp lamps on St. Paul, Queen and James Streets, to cost approximately $11,304, for 61 standards carrying 100-watt lamps on Church and Ontario Streets, $6,093.

TORONTO, ONT.—Tenders will be received until July 30 for lead-covered cable for the Toronto Electric Commissioners. Plans and specifications may be obtained from the chairman of the commissioners, 226 Yonge Street, Toronto.

SHERBROOKE, QUE.—The City Council has decided on a new street-lighting system and the installation of conduits on the main streets, estimates of cost of the latter is now being prepared by the electric committee. For experimental purposes the committee will purchase six or 12 lamp standards for street lamps. An appropriation has been made for 2000 meters. It is understood that a consulting engineer will be engaged to prepare plans in conjunction with the city engineer for the construction of an additional dam at the municipal electric-light plant on the Magog River.

PRINCE ALBERT, SASK.—Tenders will be received by J. B. Brown, city clerk, Prince Albert, until Aug. 15 for furnishing the following apparatus: (C) two 2500-gal. per minute pumps with motors and piping; (D) one 14-in. Venturi meter. Specifications may be obtained from Angus Smith, city engineer.

PRINCE ALBERT, SASK.—The city has authorized that the option between the city of Prince Albert and Kittle & Co., Ltd., of London, Eng., be signed and sealed. The company is given 60 days in which to decide whether it will accept the amended agreement for taking over the La Colle Falls power project, in connection with which the city, it is reported, has expended $1,000,000 and has built a street railway system.

SASKATOON, SASK.—The by-law appropriating $15,000 to purchase a site for a new power house has been approved by the ratepayers. Contracts have been awarded by the City Council for one steam driven centrifugal boiler feed pump, and two 4,000,000-gal motor-driven centrifugal pumps to Escher, Wyss & Co., of Montreal.

New Incorporations

BLAIRSTOWN, N. J.—The Blairstown El. Lt. Co. has been incorporated with a capital stock of $100,000 by W. H. Vail, of New York, N. Y.; J. C. Sharpe, of Blairstown, and H. C. Hunt, of Sussex. The company proposes to build and operate lighting plants.

WILMINGTON, N. C.—The Wilmington & Fort Fisher R. R. & Power Co. has been incorporated with a capital stock of $100,000 to construct a railroad to be operated by electric or other power from Wilmington to Fort Fisher Beach, a distance of 18 miles.

SPAVINAW, OKLA.—The Kay Wtr. & Pwr. Co. has been incorporated by Walter E. Kay, Thomas H. Owen and others.

CARSON CITY, NEV.—The Canyon Pwr. Co., a California corporation, has filed articles of incorporation with the Secretary of State. The company is capitalized at $1,000,000 and the incorporators are: Leon M. Grove, H. L. Breed, Charles Gross, J. E. Bowes and E. A. Herrmann, of Oakland, Cal.

SEATTLE, WASH.—The Lewis County Lt. & Power Co. has been chartered with a capital stock of $5,000 by B. F. Walling, Jr., and L. E. Kirkpatrick, 641 New York Block, Seattle.

Weekly Record of Electrical Patents

UNITED STATES PATENTS ISSUED JULY 14, 1914.

1,103,027. MOTOR CONTROL; B. Borland, Chicago, Ill. App. filed May 31, 1913. For vehicles; has special interlocking and electroresponsive devices.

1,103,040. AUTOMATIC SWITCH FOR TELEPHONE SYSTEMS; A. H. Dyson, Chicago, Ill. App. filed July 20, 1905. Wipers first given a primary adjustment to select a group of contacts in the bank and then a secondary adjustment to select a contact in the group.

1,103,041. MULTIWELD SECONDARY; E. Fulda, New York, N. Y. App. filed Feb. 18, 1914. Number of pairs of work-engaging electrodes supplied equally with current from the same transformer secondary.

1,103,060. METHOD AND MEANS FOR FIXING NITROGEN; W. S. Landis, Niagara Falls, N. Y. App. filed Apr. 3, 1914. Feeds nitrogen to a carbid charge and electrically heats to the point of ignition.

1,103,061. PROCESS AND APPARATUS FOR FIXING ATMOSPHERIC NITROGEN; W. S. Landis, Niagara Falls, N. Y. App. filed Apr. 3, 1914. Resistors buried in charge of carbid to which nitrogen is fed.

1,103,062. METHOD OF AND APPARATUS FOR FIXING NITROGEN; W. S. Landis, Niagara Falls, N. Y. App. filed Apr. 3, 1914. Resistor buried in carbid and out of contact with the circulating excess nitrogen in the charge.

1,103,073. EMERGENCY SIGNALING SYSTEM FOR TELEPHONE TOLL COLLECTING APPARATUS; J. J. O'Connell, Chicago, Ill. App. filed July 18, 1912. Permits emergency signals being sent over "prepayment" systems.

1,103,079. COIL CASES FOR INSERTION IN CABLES; F. L. Rhodes, Short Hills, N. J. App. filed Feb. 7, 1911. Case for loading coil in submarine cables.

1,103,130. CONNECTION FOR COIL-CASES AND CABLES; J. Cunningham and W. H. Horner, Riverton, N. J. App. filed Feb. 7, 1911. For submarine use.

1,103,133. PRINTING TELEGRAPH RECEIVER; A. F. Dixon, Newark, N. J. App. filed Jan. 9, 1913. Controlled by plurality of current impulses imparted over a single line conductor.

1,103,154. REVERSING SWITCH; W. S. Morse, Philadelphia, Pa. App. filed Nov. 1, 1912. Has adjustable parts.

1,103,171. SEALING PLUG FOR ELECTRICAL WATER HEATERS; R. A. Bower, San Francisco, Cal. App. filed Feb. 9, 1914. Watertight joint between switch chamber and water chamber.

1,103,192. ROTARY CONVERTER; V. A. Fynn, London, Eng. App. filed June 12, 1911. D.C. voltage regulated independently of A.C. voltage without altering magnitude of A.C. voltage impressed on converter.

1,103,199. SWITCH; G. W. Hart, West Hartford, Conn. App. filed Nov. 26, 1913. Auxiliary circuit breaker of a remotely controlled switch.

1,103,206. DIVIDED SEMI-AUTOMATIC SIGNAL LEVER; W. K. Howe, Rochester, N. Y. App. filed Jan. 19, 1912. Return indication received at the lever.

1,103,220. COUPLING FOR ELECTRICAL CONDUITS; A. C. Proudfit, Princeton, N. J. App. filed Nov. 24, 1902. Cam nut compresses fingers of coupling upon the conduit.

1,103,244. SEPARABLE ATTACHMENT PLUG; E. G. K. Anderson, Chicago, Ill. App. filed Aug. 10, 1909. Yielding lock between the separable parts of the plug.

1,103,250. SEPARABLE ATTACHMENT PLUG; R. B. Benjamin, Chicago, Ill. App. filed Aug. 10, 1909. Special connection between the parts of the plug.

1,103,251. SEPARABLE ATTACHMENT PLUG; R. B. Benjamin, Chicago, Ill. App. filed Dec. 4, 1909. Separable by slight rotation of one part.

1,103,274. ELECTRIC HEATER; H. W. Denhard, San Francisco, Cal. App. filed July 15, 1908. Water flows between positive and negative electrodes.

1,103,285. ELECTRICAL INSULATING COMPOUND; T. J. Hadley, Winnipeg, Manitoba, Canada. App. filed Sept. 29, 1913. Coal tar, kerosene, Portland cement and Japan drier.

1,103,288 SELECTIVE SIGNALING SYSTEM; R. N. Hill, Montclair, N. J. App. filed Mar. 21, 1912. "Answer-back" for party line signaling system.

1,103,294. ELECTRIC SIGN; L. H. & L. M. Jones, Wichita, Kan. App. filed Jan. 29, 1912. Controllable to flash words, symbols, etc.

1,103,309. ELECTRIC FURNACE; A. Minet & H. L. L. Lucas, Paris, France. App. filed Dec. 30, 1913. Resistance type for treatment of zinc ores.

1,103,353. ELECTRIC HEATER; G. Egly, Treptow, Germany. App. filed Apr. 8, 1913. Coats that part of heater which is coated or impregnated with a metal, with a glaze such as boracic acid.

1,103,358. METHOD OF AND APPARATUS FOR TEMPERING IRON AND STEEL ARTICLES; H. Hess, Philadelphia, Pa. App. filed May 1, 1911. Electromagnet selectively diverts the improperly heated articles, such as steel balls.

1,103,360. PICTURE EXHIBITING DEVICE; A. A. Jackson, Norwalk, Conn. App. filed Aug. 29, 1913. Pictures changed through control of thermostatic flasher.

1,103,379. METHOD OF GENERATING HEAT BY MEANS OF ELECTRIC ARCS; I. Rennerfelt, Stockholm, Sweden. App. filed Mar. 18, 1913. Employs three electrodes, one of them at right angle to the other two.

1,103,385. ELECTRICAL SYSTEM; R. Varley, Englewood, N. J. App. filed June 16, 1913. For gas engine ignition; has means for bringing a plurality of the coils into use.

1,103,405. AUTOMATIC REVERSING SWITCH; A. H. Fox & A. W. Lenderoth, New York, N. Y., and Stapleton, N. Y. App. filed June 11, 1913. For dynamos of car lighting system, etc.

1,103,411. FUSE PLUG; J. H. Hanson & J. W. Steele, Chicago, Ill. App. filed Apr. 12, 1913. Has plurality of fuses brought successfully into use.

1,103,412. SNAP SWITCH; G. W. Hart, West Hartford, Conn. App. filed July 29, 1912. Push button type.

1,103,421. CABLE TELEGRAPHY; I. Kitsee, Philadelphia, Pa. App. filed Dec. 5, 1907. Translates impulses received into the usual time-interval or Morse impulses.

1,103,438. STEERING WHEEL; R. H. Scheibert, Cincinnati, Ohio. App. filed Oct. 18, 1913. Has a circumferential series of embedded push buttons.

1,103,498. DIRECTION INDICATOR; A. Frauchiger, San Francisco, Cal. App. filed Jan. 13, 1913. For automobiles.

1,103,501. MULTIPHASE ELECTRIC MOTOR; H. Gearing, Los Angeles, Cal. App. filed Aug. 10, 1912. Power is selectively varied to accommodate different working conditions.

1,103,504. SOCKET CAP; J. H. Goss, Waterbury, Conn. App. filed May 29, 1913. Hub and cap united by rolling over or expanding.

1,103,506. HAIR STEAMING DEVICE; T. Grossert & E. Unger, New York, N. Y. App. filed Jan. 3, 1914. Electric heater coil for "waving" the hair.

1,103,511. SWITCH; W. S. Harlow, Swampscott, Mass. App. filed Apr. 29, 1909. For cutting in meter testing instrument in consumption circuit.

1,103,525. ELECTRIC SWITCH AND LOCK BOX THEREFOR; D. S. McKenna, San Francisco, Cal. App. filed Sept. 8, 1913. For autos.

1,103,528. CURRENT CONTROLLING APPARATUS; W. S. Morse, Philadelphia, Pa. App. filed Oct. 26, 1912. Double acting limit reversing switch.

1,103,529. ELECTRIC SWITCH; C. C. Newburn, Chicago, Ill. App. filed Oct. 2, 1911. Plunger and key operated type.

1,103,530. ELECTROMAGNET; C. C. Newburn, Chicago, Ill. App. filed Nov. 27, 1911. Vibrating armature construction for bells, etc.

1,103,533. ELECTRIC SOCKET PLUG; E. B. Nilsson, Chicago, Ill. App. filed Aug. 25, 1911. The screw shell terminal of the plug holds the parts together.

1,103,544. ELECTRICAL BINDING SCREW OR TERMINAL; S. Smith, Detroit, Mich. App. filed Feb. 16, 1914. Adapted to receive the conductor at various angles.

1,103,572. AUTOMATIC TELEPHONE SYSTEM; B. G. Dunham, Urbana, Ohio. App. filed July 12, 1909. Number of switches employed is varied to suit the volume of business rather than the total number of subscribers.

1,103,583. SELECTIVE SIGNALING SYSTEM; R. N. Hill, Montclair, N. J. App. filed Mar. 21, 1912. Operation of circuit closing device at any way-station causes operation of impulse relay which closes circuit for local signal at main station.

1,103,585. CLASS DRAWING APPARATUS; H. F. Hitner, Mt. Vernon, Ohio. App. filed Mar. 3, 1909. System of motors of generators for glass drawing operations.

1,103,590. EXPRESSION CONTROLLING MEANS FOR MUSICAL INSTRUMENTS; J. F. Kelly, Pittsfield, Mass. App. filed Apr. 22, 1907. Electrical system for "emphasizing," etc., on automatic player pianos.

1,103,623. MULTIPLE BRUSH SELECTOR; J. N. Reynolds, Greenwich, Conn. App. filed Nov. 21, 1913. For switches of the "panel" type used in automatic and semi-automatic systems.

1,103,626. ELECTRIC ELEVATOR; R. S. Sanford, Yonkers, N. Y. App. filed Feb. 20, 1912. D.C. control; for automatically slowing down and preventing too sudden reversals.

1,103,657. ELECTRICAL CIRCUIT CONTROLLER; V., A. A. & L. Cano, New York, N. Y. App. filed Nov. 28, 1913. Conductors supported normally out of contact on an insulating strip.

1,103,662. AUTOMATIC STARTING BOX; M. E. Custer, Carbonado, Wash. App. filed Feb. 26, 1913. Solenoids control resistances in definite order.

1,103,669. ELECTRIC MASSAGE INSTRUMENT; J. E. Gibbs, Cincinnati, O. App. filed Mar. 13, 1914. Roll with projecting body contacts.

1,103,688. ELECTRIC RELAY; W. L. Richards, East Orange, N. J. App. filed Feb. 8, 1913. Gaseous type, for amplifying feeble currents.

1,103,690. ELECTRICALLY HEATED INSTRUMENT; G. J. Schneider, Detroit, Mich. App. filed Dec. 11, 1909. Sad iron; parts secured together without use of screws.

1,103,693. ELECTRIC CIRCUIT AND MOTOR; H. M. Shedd, Roselle, N. J. App. filed Dec. 24, 1912. Motor runs at same speed either on D.C. or A.C.

1,103,748. ELECTRIC FITTING FOR CIRCUIT WIRING; M. F. Finkelstein, New York, N. Y. App. filed Nov. 17, 1911. For clamping the ends of circuit wires.

1,103,756. AUTOMATIC WATER TEMPERATURE CONTROL SYSTEM; F. R. Gebhardt, Monsey, N. Y. App. filed Feb. 12, 1914. For bath tubs.

1,103,777. MULTIPLE FUSE PLUG; A. J. Kalinowski, Lyons, Colo. App. filed July 18, 1913. Fuses successively placed in circuit.

1,103,835. HIGH TENSION CURRENT SYSTEM; R. Raines, New York, N. Y. App. filed Mar. 9, 1912. For ignition purposes.

1,103,860. SIGNALING DEVICE; G. L. Barrett, Springfield, Ohio. App. filed Sept. 6, 1913. For announcing approach of car at a remote point.

1,103,898. METHOD OF ESTABLISHING VARIABLE PATHS FOR ELECTRICAL COMMUNICATION; E. E. Clement, Washington, D. C. App. filed Mar. 4, 1912. Converges calls, when initiated, upon and distributes said calls among correlated interchangeable connective mechanisms.

1,103,905. OUTLET BOX; H. C. Mills, Unionville, Conn. App. filed Apr. 18, 1913. Especially adapted for lath and plaster partitions.

1,103,909. TELEPHONE SIGNALING SYSTEM; F. R. Parker, Chicago, Ill. App. filed Aug. 24, 1904. Employs signal lamps of not over 5/100 ampere (138 claims).

1,103,916. ELECTRIC MAKE-AND-BREAK DEVICE; G. E. Lawrence, Philadelphia, Pa. App. filed Sept. 25, 1912. Water-level recording device.